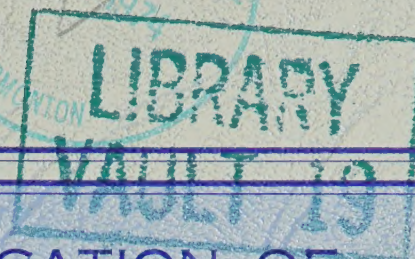


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Report on an Application of Trans Canada
Pipe Lines Limited Under the Gas 1




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REPORT ON AN APPLICATION OF TRANS CANADA PIPE LINES LIMITED UNDER THE GAS RESOURCES PRESERVATION ACT, 1956

FEBRUARY 1964

Calta
 OIL AND GAS CONSERVATION BOARD

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TO THE LIEUTENANT GOVERNOR IN COUNCIL

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I INTRODUCTION

The subject application made by Trans-Canada Pipe Lines Limited (hereinafter called "Trans-Canada") under The Gas Resources Preservation Act, 1956, was heard by the Board on September 23, 1963. Appearing for the applicant were N. J. McNeill, Q.C. and R. J. Ludgate.

Trans-Canada holds Permits numbered TC 54-1, TC 59-2, TC 60-3 and TC 60-4 which in aggregate authorize the removal from the Province of 6.605 trillion cubic feet of gas at 14.4 pounds per square inch absolute and 60 degrees Fahrenheit, being the equivalent of 6.492 trillion cubic feet of gas at 14.65 pounds per square inch absolute. Throughout this report, unless otherwise indicated, volumes will be referred to a pressure base of 14.65 pounds per square inch absolute.

In its application, Trans-Canada asked for, firstly, a new permit authorizing the removal from the Province of 1.280 trillion cubic feet of gas from the Cessford Northwest, Crossfield East, Fenn West, Hackett, Hussar North, Lone Pine Creek, Olds, Retlaw, Rich, Sylvan Lake and Verger fields during a term ending October 31, 1989; secondly, certain amendments to its subsisting permits, including an increase in the total volume of gas from 6.492 trillion cubic feet to 8.360 trillion cubic feet, and lastly, consolidation of the subsisting permits and the permit applied for in one permit. The requested amendments to subsisting permits, in addition to providing for increased volumes of gas for removal, would

provide that measurements the Permittee is required to make may be made "on behalf of" the Permittee, would extend the term of the permits to October 31, 1989, would delete the daily maximum volume limitations, would delete wording no longer appropriate, would consolidate the existing permits and would delete a proviso in Permit No. TC 54-1 regarding the total and daily amounts of gas that may be withdrawn from certain fields.

II INTERVENERS

The following registered as persons interested at the hearing:

<u>INTERVENERS</u>	<u>REPRESENTED BY</u>
Canadian Western Natural Gas Company Limited and Northwestern Utilities, Limited	G. H. Steer, Q.C.
City of Calgary	S. J. Davies
Alberta and Southern Gas Company Limited	R. A. MacKimmie, Q.C.
Westcoast Transmission Company Limited	D. P. McDonald, Q.C.
The Alberta Gas Trunk Line Company Limited	A. D. Bessemer, Q.C.
Imperial Oil Limited	D. E. Lewis, Q.C.
Consumers Gas Company	J. Lee
Shell Canada Limited	A. P. G. Walker
The California Standard Company	R. R. Mahaffey
Pan American Petroleum Corporation	B. J. Todesco
The British American Oil Company Limited	J. D. Nichols
Texaco Exploration Company	G. V. Whitaker

III SUBMISSION OF THE APPLICANT

1. Application for New Permit and Increased Volumes in Subexisting Permits

Trans-Canada's application requested an increase of 3.148 trillion cubic feet of gas for removal from the Province, 1.280 trillion cubic feet from new fields not covered in the present permits and 1.868 trillion cubic feet by an increase in the volumes from fields included in the present permits.

Trans-Canada gave evidence of the expansion of its Canadian market to a point where additional quantities of gas were required to meet the demand. Mr. V. L. Horte, Vice-President Gas Supply, of Trans-Canada and one of its witnesses, indicated that the market was increasing during current years at the rate of thirty billion cubic feet per year. With regard to the new permit applied for, Mr. Horte also gave evidence that Trans-Canada had, by gas purchase contracts and letters of intent, arranged to purchase from operators in the fields that would be named in the new permit, volumes of gas to meet the proposed permit volumes. In dealing with the subsisting permits, it was submitted that when they were issued Trans-Canada had under contract substantially all of the reserves then considered to exist in each field. Subsequent drilling resulted in an increase in reserves in many fields, and to prevent or minimize drainage of gas from non-producing properties Trans-Canada contracted for additional reserves with a view to marketing the gas in Eastern Canada.

In support of its application Trans-Canada contended that "the additional quantities of gas applied for are surplus to the present and future needs of persons within the Province having regard to the established reserves, trends in growth and discovery of reserves, the requirements of the Province and the quantities of gas required to meet the existing permits granted by this Board." Trans-Canada concurred in the Board's estimate of marketable reserves as of December 31, 1962, (34.3 trillion cubic feet of 1,000 Btu gas) and the Board's estimate of Alberta requirements projected from that appearing in the 1959 Report⁽¹⁾. After deducting reserves necessary to meet Alberta's thirty-year requirements and reserves necessary to meet present permit commitments, Trans-Canada concluded that a surplus of 7.9 trillion cubic feet of gas existed at December 31, 1962, and that in the light of this surplus its request for the removal of an additional 3.148 trillion cubic feet should be granted.

2. Extension of Term of Permits

Trans-Canada said that as a result of purchase contracts made since the permits were granted and for gas in certain fields covered by the subsisting permits, the extension of the permit period would be necessary to enable it to purchase and remove gas during the twenty-five year term of such contracts. In addition, the applicant anticipated that gas would continue to be produced and delivered after May 14, 1981, under the applicant's older contracts in those fields.

(1) Report to the Lieutenant Governor in Council with Respect to Applications under The Gas Resources Preservation Act, 1956. December, 1959.

3. Maximum Daily Volume Limitations

Trans-Canada requested the deletion of maximum daily limits from its permits to provide it with more flexibility in its day to day operations. It submitted that the change would not adversely affect the protection afforded the Alberta consumers since the annual and total volume limitations would remain unchanged. It requested alternatively, that if this request were not granted the maximum day limitation be set at 1.170 billion cubic feet for its subsisting permits, amended and consolidated, or 1.330 billion cubic feet for the consolidation of its subsisting and newly applied for permits.

4. Measurement Provisions

The permits require that all gas removed from the Province shall be measured by the Permittee. Trans-Canada's gas is measured by The Alberta Gas Trunk Line Company Limited when it enters the trunk line facilities. The applicant proposed that it should be also measured by Trunk Line when it leaves the trunk line facilities to enter the Trans-Canada line. For this purpose it asked that the measurement provisions provide for measurement "by or on behalf of" the Permittee.

5. Proviso in Permit No. TC 54-1

A proviso clause 5 of the terms and conditions of Permit No. TC 54-1 reads "provided, however, that the total and daily amounts of gas to be withdrawn by or on behalf of Trans-Canada from each of the Erskine, Fenn-Big Valley, Homeglen-Rimbey,

Nevis and Stettler fields are subject to the approval of the Board". Trans-Canada submitted that in view of an agreement with Canadian Western Natural Gas Company and Northwestern Utilities, Limited to provide them with gas from any of its sources this proviso would not be considered necessary.

6. Consolidation of Permits

Trans-Canada requested the consolidation of permits on the ground that volume limitations in the individual permits reduce its flexibility in purchasing gas. It said contract volumes are continually changing within the individual fields as a result of re-determination of reserves, and the expansion of fields due to further development results in new contracts being entered into and in volume changes. It submitted further that a consolidated permit would afford the same protection to Alberta consumers since the volume limitations in it would equal the sum of the individual permit limitations and because each of the fields named in the permit would be connected to the system of The Alberta Gas Trunk Line Company Limited.

IV SUBMISSIONS OF INTERVENERS

1. Northwestern Utilities, Limited and
Canadian Western Natural Gas Company Limited

The utility companies' submission was presented through their witness, Mr. B. F. Willson, President of the two companies. Mr. Willson suggested that, in determining gas surplus to Alberta requirements, the Board need not make any

significant revisions to its estimates of long term Alberta gas requirements and should continue to deduct from the total, established gas reserves which is considered to be beyond economic reach. This latter deduction was not made by the applicant in its analysis of the Alberta surplus. Upon cross-examination Mr. Willson said a portion of the gas now classed as beyond economic reach will become within economic reach in time, but in the meantime the risks associated with any such reserve should be borne by the extra-provincial communities or customers rather than the local consumer.

The utility companies also expressed concern over the tendency to allocate an increasingly greater portion of local requirements to future reserves. Mr. Willson stated that in 1954 no part of the local requirements was made dependent on future discoveries. In 1958, 15 per cent, and in 1959, 37 per cent were assumed to come from future discoveries and appreciation of reserves in existing fields. He said that in view of the recent decline in reserves discovered per wildcat well drilled he felt Alberta's requirements should be fully protected from proved reserves.

Trans-Canada recalled Mr. Horte to present rebuttal evidence. He indicated that virtually all development drilling since 1955 had occurred in fields connected to market and where there is an incentive to expand the fields.

With regard to the deletion of the proviso above referred to from Permit No. TC 54-1, Mr. Willson said that the problem giving rise to the proviso still existed in that the manner

in which the thirty-year requirements of the Central Alberta area are to be met economically was still far from clear. Mr. Willson said that gas purchased by the utilities from permittees is more expensive than the utilities believe they can eventually contract for. He stated, in addition, that the Stettler and Fenn-Big Valley fields should be wholly removed from the permit as they were being used to supply local needs. In Mr. Horte's rebuttal he indicated that Trans-Canada had made arrangements with The British American Oil Company Limited to make small volumes of gas available to British American at its Lookout Butte plant in exchange for other gas from the Fenn-Big Valley Field, and he objected to the suggestion that the Fenn-Big Valley and Stettler fields be eliminated from Trans-Canada's permit.

2. Alberta and Southern Gas Co. Ltd.

Alberta and Southern's witness was its Vice-President, Mr. S. R. Blair. He considered that all reserves, including those beyond economic reach, should be used in determining the amount of gas surplus to the Province. He stated that though some such reserves occur in very small pools, recognition should be given to the prospect of such pools becoming economic. Commenting on the decline in reserves discovered per wildcat well, Mr. Blair indicated that discoveries are related to incentive and felt that when a market is again present, growth will resume its rapid pace accordingly.

3. The California Standard Company

The California Standard Company questioned the validity of Mr. Willson's contention that because of the decline in gas reserves discovered per wildcat well, Alberta's thirty-year requirements should be fully protected from present proved reserves. Its witness, Mr. H. G. Nicholson, Vice-President of California Standard, stated that the difficulty of finding an immediate market for gas discovered during recent years has reduced the incentive for industry to prospect for and develop large new reserves and has resulted in a continuing reluctance to tie up capital on which no reasonable return may be expected.

4. Pan American Petroleum Corporation

Pan American, through its witness, Mr. A. H. Denny, Gas Sales Superintendent of Pan American, supported Trans-Canada's application for removal of additional volumes of gas. He said that the issue of the requested permits would provide an incentive for the gas producing industry and that without provision for an adequate market there is little justification for the investment of large sums in wildcat and development drilling activities. He said that the Board's policy of recognizing two years future gas discoveries when considering the requirement of Alberta is a logical and conservative approach. Further, he said that some of the gas reserves in Alberta beyond economic reach of a pipeline will eventually be within economic reach as markets develop and gas gathering systems expand.

5. Imperial Oil Limited

Imperial Oil did not present evidence but stated its support of the application.

V FINDINGS

The Board having publicly heard the application under The Gas Resources Preservation Act, 1956, of Trans-Canada Pipe Lines Limited, and having studied the evidence submitted by the applicant and the interveners at the public hearing, and having regard to the advice of its staff, to its own knowledge, and to its responsibility under the Act, finds as follows:

1. IN THE MATTER OF THE ESTABLISHED RESERVES
OF GAS IN THE PROVINCE OF ALBERTA

The Board estimates the established reserves of marketable gas in the Province of Alberta, as of September 30, 1963, to be 33.2 trillion cubic feet (equivalent to 35.1 trillion cubic feet of 1000 Btu gas). Of this total, some 3.7 trillion cubic feet represent reserves presently beyond economic reach. The present estimate represents an increase of some 0.8 trillion cubic feet since December 31, 1962. Details of the Board's estimate are presented in Appendix A.

2. IN THE MATTER OF THE TRENDS IN EXPLORATION
AND THE GROWTH OF RESERVES OF GAS IN ALBERTA

To September 30, 1963, the cumulative average growth in initial marketable reserves due to new discoveries and to appreciation of known reserves has been at a long term rate of some 2.5 trillion cubic feet per year. Over the

past several years growth has been at a lower rate and over the past two years growth has been at the lower rate of about 1.8 trillion cubic feet per year. The Board is convinced that the recent decline in reserve growth rate is due at least in part to a lack of market incentive for the development of discoveries. It is confident that much more gas will be discovered in Alberta and that the Province may reasonably count on a growth of 3.6 trillion cubic feet over the next two years. Details of the Board's appraisal of the trends appear in Appendix B.

3. IN THE MATTER OF THE PRESENT AND FUTURE
REQUIREMENTS OF ALBERTA FOR GAS AND THE
PRESENT PERMIT COMMITMENTS

The Board estimates the actual requirements of Alberta for gas for the thirty-year period, October 1, 1963, to September 30, 1993, to be some 8,74 trillion cubic feet with a peak day requirement of about 2.3 billion cubic feet in 1993. For comparative purposes, the last estimate, made by the Board and submitted in its report of September, 1959, to the Lieutenant Governor in Council, indicated the requirements for a thirty-year period commencing January 1, 1960, to be 8.4 trillion cubic feet with a terminal year peak day of 2.1 billion cubic feet. While experience has proved the latter forecast to be high during its early years, a reappraisal of future requirements indicates that it was likely somewhat low for the later years of the period.

The remaining commitments as of September 30, 1963, associated with permits issued for the removal of gas from Alberta total some 12.8 trillion cubic feet of 1000 Btu gas.

A discussion of the Board's latest study concerning the future requirements of Alberta and details of the remaining permit commitments are presented in Appendix C.

4. IN THE MATTER OF THE MEETING OF THE 1963
TO 1993 REQUIREMENTS OF ALBERTA TOGETHER
WITH THE PRESENT PERMIT COMMITMENTS AND
THE RESULTING SURPLUS

The Board estimates that reserves totalling some 14.4 trillion cubic feet of 1000 Btu gas are necessary to meet the annual and peak day requirements of Alberta for the thirty-year period commencing October 1, 1963. In addition, the Board estimates that some 17.4 trillion cubic feet of 1000 Btu gas are required to meet the permit commitments. Of this latter some 4.6 trillion cubic feet are that gas which is estimated to be necessary to protect the maximum daily delivery rates authorized under the permits. This quantity of gas would become available for other use upon termination of the permits.

The Board estimates the reserves available to meet the thirty-year requirements of the Province and the remaining permit commitments to be 36.2 trillion cubic feet. This figure includes one-half of the established reserves now considered beyond economic reach plus those reserves which

the Board confidently expects to be discovered over the next two years. On this basis the Board estimates the surplus of gas within the Province to be 4.4 trillion cubic feet after allowing for protection of deliveries at the maximum daily rates authorized in the permits. Upon expiration of the permits a further 4.6 trillion cubic feet would become surplus.

Details of the Board's analysis of these matters appear in Appendix D.

5. IN THE MATTER OF THE APPLICANT'S REQUEST
FOR AUTHORIZATION FOR THE REMOVAL OF
ADDITIONAL QUANTITIES OF GAS AND THE
SURPLUS WHICH WOULD RESULT IF THE REQUEST
WERE APPROVED

Having regard to the applicant's request for consolidation of all its permits, to which the Board agrees, the Board has combined the request for an increase of 1.868 trillion cubic feet from fields included in the present permits with that for 1.280 trillion cubic feet from new fields. The Board agrees that gas in this total volume is surplus to the present and future annual and peak day requirements of the Province and may be produced within the requested term - although as the applicant recognizes the reserves would not support full deliverability for the last several years of the term.

Were both those increased volumes requested by the applicant approved, the commitments of all permits would

be increased from the present 17.4 trillion cubic feet of 1000 Btu gas, of which 4.6 trillion cubic feet is for the protection of deliveries at the maximum days authorized in the permits, to 18.6 trillion cubic feet, of which 2.5 trillion cubic feet would be for the protection of the maximum days which the Board believes could be supported by the fields involved.

This would leave a surplus of gas of 3.2 trillion cubic feet having regard to the gas required to protect the maximum days authorized in the permits. This surplus would be increased by 2.5 trillion cubic feet upon expiration of the permits.

Details of the Board's analyses relating to these matters are presented in Appendix E.

6. IN THE MATTER OF CERTAIN OTHER ASPECTS
OF THE APPLICATION OF TRANS-CANADA PIPE
LINES LIMITED

(1) The Request for Removal of the Maximum Daily
Restriction

As far as the present situation is concerned the Board is inclined to agree with the applicant and the interveners that the restriction of maximum daily withdrawals might be eliminated without risk to the protection of Alberta consumers. However, having regard to the future, to other permits now issued, and to new permits which may be issued, the Board does not consider it would be in the interest of the Province if it did not retain control on maximum daily

withdrawal rates. Accordingly, the Board is not prepared to grant this part of the application, but to provide the flexibility desired by the applicant it is prepared to grant relief from the maximum day limitations in situations where it is justifiable.

(2) The Request for an Extension in the Term of the Present Permits

The Board agrees with the applicant that an extension in the term of the present permits is necessary to permit the applicant to remove the additional gas applied for. This is because of the addition to reserves and the delivery characteristics of the fields and the contracts which Trans-Canada Pipe Lines Limited has entered into.

(3) The Request that the Metering of Gas required by the Permit may be "on Behalf of" the Applicant.

The Board agrees that this should be authorized.

(4) The Request that the Existing and the Newly Applied for Permits be Consolidated in One

The Board recognizes that consolidation of the permits would give the applicant greater operating flexibility and that it could be done without risk to the protection of Alberta consumers.

(5) The Request for the Deletion of the proviso of clause 5 of the terms and conditions of Permit No. TC 54-1

The Board concurs with the applicant that the principal reason for the special restriction on withdrawals from the Erskine, Fenn-Big Valley, Homeglen-Rimbey, Nevis and Stettler

fields has been removed and that it is proper that the proviso now be deleted.

These aspects of the application, dealt with above under headings numbered (1) to (5), are discussed in further detail in Appendix F.

7. IN THE MATTER OF THE OVERALL DISPOSITION
 OF THE APPLICATION OF TRANS-CANADA PIPE
 LINES LIMITED

All things considered, the Board is prepared, with the approval of the Lieutenant Governor in Council, to rescind the existing Permit No. TC 54-1, Permit No. TC 59-2, Permit No. 60-3 and Permit No. 60-4, and to issue a new permit to Trans-Canada Pipe Lines Limited authorizing it to remove 9.640 trillion cubic feet of gas from Alberta, the permit to be in the form shown in Appendix G and subject to the terms and conditions therein contained.

Respectfully submitted,

G. W. Govier, P. Eng.,
Chairman.

A. F. Manyluk, P. Eng.,
Deputy Chairman.

V. Millard,
Board Member.

Dated at Calgary, Alberta,
this 13th day of February, 1964.

APPENDIX A

THE ESTABLISHED RESERVES OF GAS IN ALBERTA

The Board estimates that the initial marketable reserves of gas in Alberta have changed from some 35.5 trillion cubic feet as of December 31, 1962, to some 36.9 trillion cubic feet at September 30, 1963, - an increase of 1.4 trillion cubic feet during the nine-month period.

To September 30, 1963, a total of some 3.6 trillion cubic feet of marketable gas has been produced, with 0.6 trillion cubic feet having been produced during the period, January 1 to September 30, 1963.

The remaining marketable gas at September 30, 1963, is estimated to be 33.2 trillion cubic feet (equivalent to 35.1 trillion cubic feet of 1000 Btu gas), an increase of approximately 0.8 trillion cubic feet since December 31, 1962.

The major portion of the increase is due to the appreciation of discoveries made in previous years. As has been the case in the past few years, new discoveries, as now developed, have been somewhat disappointing. Only 105 billion cubic feet of marketable gas has been attributed to new discoveries during the first nine months of 1963.

In its estimate of reserves, the Board has considered estimates presented by Trans-Canada at the hearing, by the industry at various times during the nine-month period,

and by its staff. Trans-Canada estimated the established initial marketable reserves of gas in the fields from which it is now removing gas and the areas from which it has applied to remove gas to be some 10.2 trillion cubic feet. The Board also estimates the established initial marketable reserves in the same fields and areas to be about 10.2 trillion cubic feet. While there is agreement in the overall estimate of reserves, there are differences in the estimates for some of the individual fields. The major portion of the difference in the estimates may be attributed to the geological interpretation of the areal extent of the gas bearing reservoir. In some cases, Trans-Canada considers a reservoir to be larger than does the Board, in other cases the reverse is true. The following tabulation shows the fields for which the differences are greatest:

	<u>Estimated Reserves</u>	
	<u>Trans-Canada</u>	<u>Board</u>
Atlee-Buffalo	53	146
Gilby	633	511
Princess	98	221
Provost	773	555
Carstairs	806	924
Wimborne	279	198
Crossfield East	319	220
Olds	375	200

Trans-Canada did not present estimates of reserves for fields other than those in its present permits or those for which it was applying for the first time.

Since December 31, 1962, for the Province as a whole there have been a number of discoveries and some changes in the estimate of remaining marketable reserves in certain of the previously known pools. The more significant ones are indicated in the following tabulation:

<u>Area</u>	<u>Dec.31,1962 Estimate Bcf</u>	<u>Present Estimate Bcf</u>	<u>Change Bcf</u>	<u>Reasons for Change</u>
Ansell	80	-	- 80	Included in Edson Area.
Edson	-	900	+900	New drilling and amalgamation of areas formerly called Ansell, Rodney, Moose Creek and Erith.
Harmattan-Elkton	1117	1063	- 54	Production, also reservoir volume reduced due to new well.
Jumping Pound West	-	100	+100	New area.
Kaybob	371	419	+ 48	Additional drilling.
Kaybob South	-	63	+ 63	Additional drilling, also includes area formerly called "Tony Creek."
Marten Hills	70	141	+ 71	Additional drilling.
Olds	140	200	+ 60	Area enlarged.
Pembina	1000	936	- 54	Production
Windfall	411	493	+ 82	Additional drilling.

The Board's estimates of established reserves are presented in Table A-1. The table does not show individually fields or areas having a marketable reserve of less than 10 billion cubic feet unless the reserve is supplying a market. However, the sum of these reserves is shown at the end of the table, and is included in the Provincial total. The location of the fields and areas contained in Table A-1 is shown on Figure A-1.

TABLE A-1

ESTABLISHED RESERVES OF GAS IN THE PROVINCE OF ALBERTA, SEPTEMBER 30, 1963

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
ACHESON	VIKING	14	25/5	10	1	9	1020	9	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED.
	BASAL BLAIRMORE	37	20/15	25	2	23	1020	23	
	LEDUC SOLUTION	80	45/55	20	5	15	1140	17	
ACHESON EAST	BASAL BLAIRMORE	12	15/5	10	-	10	1090	11	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
ADEN	BOW ISLAND	5	20/5	4	-	4	1000	4	GAS SOLD TO CANADIAN MONTANA GAS COMPANY LTD.
	BASAL COLORADO	6	15/5	5	1	4	1000	4	
	MANNVILLE	2	10/5	2	-	2	1000	2	
	SUNBURST-ELLIS	16	20/5	12	-	12	1040	12	
	MISSISSIPPIAN	19	10/10	15	2	13	1040	14	
ALEXANDER	BASAL BLAIRMORE	110	15/5	90	78	12	1060*	13	GAS SOLD TO NORTH CANADIAN OILS LIMITED AND CALGARY POWER LTD.
ALIX	BASAL BLAIRMORE	12	10/5	10	-	10	1090	11	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	NISKU ASSOCIATED	7	15/10	5	-	5	1130	6	
ANTELOPE	VIKING	40	20/5	30	-	30	1020	31	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	BANFF	11	20/5	8	-	8	1020	8	
ATHABASCA	GRAND RAPIDS	6	15/5	5	1	4	1030	4	SUPPLIES LOCAL UTILITY. PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	WABAMUN	4	10/5	3	-	3	1020	3	
ATHABASCA EAST	WABAMUN	2	10/5	2	1	1	1000	1	SUPPLIES LOCAL UTILITY.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
ATLEE-BUFFALO	BOW ISLAND BASAL COLORADO BASAL BLAIRMORE	120 7 72	25/5 15/5 20/5	85 6 55	5 - 1	80 6 54	960* 1020 960*	77 6 52	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
BANTRY-TILLEY	MILK RIVER BOW ISLAND BASAL BLAIRMORE BASAL BLAIRMORE ASSOCIATED	46 20 7 7	20/5 20/5 15/5 20/5	35 15 6 5	- - - -	35 15 6 5	960 970 1160 1160	34 15 7 6	SUPPLIES LOCAL UTILITY, PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BASHAW	BASAL BLAIRMORE LEDUC ASSOCIATED	9 7	10/5 15/30	8 4	- -	8 4	970 1220	8 5	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BAWLF	VIKING BLAIRMORE	11 3	25/5 20/5	8 2	- -	8 2	1020 1050	8 2	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BEAVER CREEK	WABAMUN	94	15/50	40	-	40	1050*	42	
BEAVERHILL LAKE	VIKING BASAL BLAIRMORE	220 4	20/5 15/5	170 3	1 -	169 3	1000 1000	169 3	SUPPLIES LOCAL UTILITY.
BELLOY	CADOTTE NOTIKWIN GETHING MISSISSIPPIAN	5 9 62 23	20/5 20/5 15/5 10/5	4 7 50 20	- - - -	4 7 50 20	1020 1000 1000 1120	4 7 50 22	
BELLSHILL LAKE	VIKING BLAIRMORE BLAIRMORE ASSOCIATED	6 37 3	25/5 15/5 15/10	4 30 2	- - -	4 30 2	1040 990 990	4 30 2	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BERLAND RIVER	LEDUC	440	10/25	300	-	300	1000	300	
BERLAND RIVER WEST	WABAMUN	24	10/30	15	-	15	1020	15	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BIGORAY	BLAIRMORE MISSISSIPPIAN	14 13	15/5 15/10	11 10	- -	11 10	1080 1080	12 11	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING GAS AT VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
BIGSTONE	GETHING DUNVEGAN LEDUC	23 29 74	10/5 10/5 10/25	20 25 50	- - -	20 25 50	1100 1140 930	22 29 47	INCLUDES AREA FORMERLY CALLED JACKFISH.
BINDLOSS	VIKING BASAL BLAIRMORE	430 31	15/5 15/5	350 25	37 -	313 25	970* 990	304 25	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
BITTERN LAKE	VIKING BASAL BLAIRMORE	3 43	25/5 15/5	2 35	- -	2 35	1020 1070	2 37	
BLACK BUTTE	BOW ISLAND BASAL COLORADO MANNVILLE SUNBURST-ELLIS MISSISSIPPIAN	21 25 6 35 12	15/5 15/5 15/5 10/5 15/5	17 20 5 30 10	1 4 - 17 1	16 16 5 13 9	1010 1000 1000 1000 1020	16 16 5 13 9	GAS SOLD TO CANADIAN MONTANA GAS COMPANY LTD.
BLINDMAN RIVER	PEKISKO BANFF	23 18	10/5 10/5	20 15	- -	20 15	1090 1080	22 16	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BLUERIDGE	DETITAL MISSISSIPPIAN	14 1	10/5 20/5	12 1	- -	12 1	1100 1130	13 1	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BOLLOQUE LAKE	VIKING BASAL BLAIRMORE	3 11	25/5 25/5	2 8	- -	2 8	1040 1100	2 9	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BONNIE GLEN	VIKING BLAIRMORE LEDUC ASSOCIATED LEDUC SOLUTION	2 5 430 510	15/10 10/10 10/15 40/25	2 4 380 230	- 2 3 39	2 2 327 191	1050 1100 1220 1220	2 2 399 233	GAS SOLD TO NORTHWESTERN UTILITIES, LIMITED.
BONNYVILLE	BLAIRMORE	5	20/5	4	1	3	980	3	SUPPLIES LOCAL UTILITY.
BOUNDARY LAKE SOUTH	MISSISSIPPIAN	27	10/5	23	7	16	1040*	17	GAS SOLD TO WESTCOAST TRANSMISSION COMPANY LIMITED.
BOW ISLAND	BOW ISLAND	20	20/5	15	-2	17	1110	19	CANADIAN WESTERN NATURAL GAS COMPANY LIMITED STORAGE RESERVOIR.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU.FT. BCF	REMARKS
BOYLE-MUSTANG- AMISK LAKE	BLAIRMORE NISKU	7	25/5	5	-	5	1000	5	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
		6	15/5	5	-	5	990	5	
BRAEBURN	CADOMIN TRIASSIC PERMO-PENN	10	15/5	8	-	8	1060	8	
		26	20/5	20	-	20	1090	22	
		52	15/10	40	-	40	1030	41	
BRAZEAU RIVER	MISSISSIPPIAN	190	10/10	150	-	150	1040	156	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BROOKS	MILK RIVER	9	20/5	7	3	4	990	4	SUPPLIES LOCAL UTILITY.
BROOKS NORTH-EAST	BOW ISLAND BASAL COLORADO MANNVILLE DETITAL	14	25/5	10	-	10	960	10	SUPPLIES LOCAL UTILITY.
		1	20/5	1	-	1	1000	1	
		22	20/5	17	2	15	1030	15	
		11	15/5	9	-	9	1030	9	
BROWN CREEK	MISSISSIPPIAN	52	15/10	40	-	40	970	39	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BURNT RIVER	PEACE RIVER BLUESKY	2 9	10/5 10/5	2 8	- -	2 8	1010 1020	2 8	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
BURNT TIMBER	MISSISSIPPIAN	170	10/20	120	-	120	1080	130	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
CAMPBELL-NAMAO	BASAL BLAIRMORE ASSOCIATED BASAL BLAIRMORE SOLUTION	29	10/5	25	7	18	1020	18	GAS SOLD TO CANADIAN INDUSTRIAL GAS LIMITED.
		6	40/20	3	1	2	1020	2	
CARBON	VIKING BLAIRMORE BASAL BLAIRMORE MISSISSIPPIAN	7	20/5	5	-	5	1020	5	GAS SOLD TO CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
		130	10/5	110	3	107	1100	118	
		3	20/5	2	-	2	1100	2	
		11	10/5	9	-	9	1080	10	
CAROLINE	BASAL BLAIRMORE	19	10/10	15	-	15	1070	16	RESERVOIR BEING CYCLED.
CARSON CREEK	BEAVERHILL LAKE	240	10/15	180	-	180	1050	189	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT., BCF	REMARKS
CARSON CREEK NORTH	BEAVERHILL LAKE ASSOCIATED	28	15/15	20	-	20	1100	22	
	BEAVERHILL LAKE SOLUTION	330	35/20	170	-	170	1100	187	
CARSON LAKE	MISSISSIPPIAN	12	10/10	10	-	10	1050	11	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
CARSTAIRS	BASAL BLAIRMORE	5	15/10	4	-	4	1100	4	
	MISSISSIPPIAN	1100	10/10	920	78	842	1100*	926	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
CASTOR	VIKING	22	15/5	18	-	18	1040	19	
	BLAIRMORE	2	10/5	2	-	2	1070	2	
CESSFORD	VIKING	200	20/5	150	1	149	1020	152	
	BASAL COLORADO	1300	20/5	1000	150	850	1020	867	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
	BASAL BLAIRMORE	420	15/5	340	26	314	1020	320	
CHIGWELL	BLAIRMORE	74	10/10	60	4	56	1100*	62	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
CHINOOK RIDGE	PADDY	12	10/10	10	-	10	1020	10	
	CADOTTE	31	10/10	25	-	25	1020	26	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	NOTIKEMIN	19	10/10	15	-	15	1020	15	
CHISHOLM	BLAIRMORE	12	10/5	10	-	10	1020	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
CLEAR HILLS	GETHING	1	15/5	1	-	1	980	1	
	TRIASSIC	8	10/5	7	-	7	1030	7	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	LEDUC	4	15/5	3	-	3	1070	3	
CLIVE	VIKING	4	20/5	3	-	3	990	3	
	BLAIRMORE	7	15/5	6	-	6	1020	6	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	NISKU ASSOCIATED	9	10/15	7	-	7	1150	8	
	LEDUC ASSOCIATED	5	15/25	3	-	3	1200	4	
COLD LAKE	BLAIRMORE	6	25/5	4	2	2	1000	2	SUPPLIES LOCAL UTILITY.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU.FT. BCF	REMARKS
COMREY	SECOND SPECKS BOW ISLAND	4 29	20/5 10/5	3 25	- 11	3 14	940 940	3 13	GAS SOLD TO CANADIAN MONTANA GAS COMPANY LTD.
CONNORSVILLE	VIKING BASAL BLAIRMORE	7 14	15/5 15/5	6 11	- -	6 11	990 1130	6 12	
CONTROL	VIKING BASAL MANNVILLE	22 20	15/5 20/5	18 15	- -	18 15	970 1030	17 15	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
COUNTRESS	BOW ISLAND BASAL COLORADO BASAL BLAIRMORE MISSISSIPPIAN MISSISSIPPIAN ASSOCIATED	79 56 8 2 3	20/5 25/5 10/5 15/5 20/10	60 40 7 2 2	2 8 2 - -	58 32 5 2 2	960* 960* 960 960 960	56 31 5 2 2	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
CRAIGEND	GRANDE RAPIDS GROSMONT	1 140	25/5 25/5	1 100	- -	1 100	1000 1000	1 100	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
CROSSFIELD	CARDIUM SOLUTION BASAL BLAIRMORE MISSISSIPPIAN WABAMUN	91 20 1900 1400	60/45 15/10 10/15 15/50	20 15 1450 600	- - 78 15	20 15 1372 585	1120 1100 1080* 1060*	22 17 1482 620	GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD. AND WESTCOAST TRANSMISSION COMPANY LIMITED.
CROSSFIELD EAST	MISSISSIPPIAN WABAMUN	130 350	10/15 15/60	100 120	- -	100 120	1120 1060	112 127	
DIXONVILLE	GETHING	12	10/5	10	-	10	1000	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
DONALDA	VIKING BASAL BLAIRMORE DETRI TAL	40 5 5	20/5 15/5 20/5	30 4 4	- - -	30 4 4	970 970 990	29 4 4	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
DOWLING LAKE	BASAL BLAIRMORE	5	20/5	4	1	3	1150	3	SUPPLIES LOCAL UTILITY.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
DRUMHELLER	VIKING BLAIRMORE	4 23	25/5 10/5	3 20	- -	3 20	1100 1100	3 22	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
DUVERNAY	VIKING	4	20/5	3	1	2	980	2	GAS SOLD TO WESTERN MINERALS LTD. PLANT
DYBERG	BELLY RIVER VIKING BASAL BLAIRMORE	3 8 12	20/5 10/5 10/5	2 7 10	- - -	2 7 10	950 1000 1020	2 7 10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
EAGLESHAM	GETHING CADOMIN MISSISSIPPIAN	6 7 99	15/5 10/5 10/5	5 6 85	- - -	5 6 85	1000 1060 1110	5 6 94	
EDSON	MISSISSIPPIAN	1200	10/15	900	-	900	1030	927	INCLUDES AREAS FORMERLY CALLED ANSELL AND RODNEY.
ELK POINT	MANNVILLE	4	25/5	3	1	2	990	2	SUPPLIES LOCAL UTILITY.
ENCHANT	MILK RIVER BOW ISLAND BASAL BLAIRMORE ELLIS MISSISSIPPIAN	8 25 10 3 5	30/5 25/5 20/10 25/10 15/10	5 18 7 2 4	- - 1 - -	5 18 6 2 4	1030 1030 1030 1030 1030	5 19 6 2 4	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
ERSKINE	VIKING BLAIRMORE ASSOCIATED LEDUC ASSOCIATED LEDUC SOLUTION	4 20 31 19	20/5 15/10 10/20 35/60	3 15 22 5	- - - -	3 15 22 5	1040 1090 1070 1110	3 16 24 6	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
ESTHER	VICTORIA	23	30/5	15	-	15	990	15	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
ETZIKOM	BOW ISLAND BASAL BLAIRMORE	79 1	20/5 25/5	60 1	23 -	37 1	930 1010	34 1	GAS SOLD TO SOUTH ALBERTA PIPE LINES LTD.
EXCELSIOR	VIKING BASAL BLAIRMORE	9 39	15/5 10/5	7 33	- -	7 33	1000 970	7 32	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT, 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT, 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
EYREMORE	Bow Island	15	30/5	10	-	10	960	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH,
FAIRYDELL-BOW ACCORD	VIKING BASAL BLAIRMORE	130 19	20/5 15/5	100 15	11 -	89 15	1020 1000	91 15	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED.
FAUST SOUTH	GETHING	12	10/5	10	-	10	990	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH,
FENN-BIG VALLEY	VIKING NISKU SOLUTION LEDUC ASSOCIATED AND SOLUTION	20 150 11	20/5 45/35 35/45	15 53 4	3 16 1	12 37 3	1000 1110 1110	12 41 3	GAS SOLD TO CANADIAN WESTERN NATURAL GAS COMPANY LIMITED AND TRANS-CANADA PIPE LINES LIMITED,
FIGURE LAKE	VIKING BLAIRMORE NISKU	6 11 19	25/5 15/5 15/5	4 9 15	- - -	4 9 15	960 1000 1000	4 9 15	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH,
FOREMOST	Bow Island	33	15/5	27	6	21	950	20	GAS SOLD TO CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
FORT KENT	BLAIRMORE	5	20/5	4	1	3	980	3	SUPPLIES LOCAL UTILITY.
FORT SASKATCHEWAN	VIKING	220	10/5	190	56	134	1000	134	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED AND MID-WESTERN INDUSTRIAL GAS LTD.
FOX CREEK	VIKING GETHING TRIASSIC	6 1 5	15/5 25/5 15/10	5 1 4	- - -	5 1 4	1160 1160 1160	6 1 5	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH,
FOX CREEK WEST	GETHING NISKU	5 18	10/5 10/20	4 13	- -	4 13	1020 1150	4 15	
GARRINGTON	VIKING BLAIRMORE LEDUC	24 1 35	20/10 25/10 10/20	17 1 25	- - -	17 1 25	1000 1010 1020	17 1 26	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
GHOST PINE	BLAIRMORE	37	10/10	30	-	30	1010	30	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH,
	BLAIRMORE								
	ASSOCIATED	8	20/10	6	-	6	1050	6	
	MISSISSIPPIAN	3	15/10	2	-	2	1070	2	
GILBY	VIKING	4	20/5	3	-	3	1220	4	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED,
	BASAL BLAIRMORE	130	10/15	100	2	98	1160	114	
	JURASSIC	200	10/15	150	-	150	1020	153	
	MISSISSIPPIAN	330	10/15	250	18	232	1080	251	
	SANFF	4	20/15	3	-	3	1100	3	
	WABAMUN	7	10/20	5	-	5	1170	6	
GLEN PARK	BASAL BLAIRMORE	9	15/5	7	1	6	1140	7	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED,
	LEDUC SOLUTION	16	40/20	8	2	6	1250	8	
GOLDEN SPIKE	VIKING	4	20/5	3	1	2	1050	2	GAS INJECTED INTO LEDUC ZONE,
	BLAIRMORE	22	10/5	19	1	18	1050	19	
	WABAMUN	26	10/15	20	6	14	1060	15	
	NISKU ASSOCIATED	4	10/15	3	-	3	1220	4	
	NISKU SOLUTION	6	35/20	3	1	2	1220	2	
	LEDUC SOLUTION	95	25/30	50	-8	58	1290	75	
GOODWIN LAKE	VIKING	4	20/5	3	-	3	1020	3	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH,
	NORDEGG	31	10/10	25	-	25	1070	27	
GORDONDALE	PADDY	53	15/5	43	19	24	1000	24	GAS SOLD TO WESTCOAST TRANSMISSION COMPANY LIMITED,
	NOTTIKEWIN	4	20/5	3	-	3	1020	3	
	GETHING	68	15/5	55	23	32	1050	34	
GREENCOURT	JURASSIC- DETRI TAL	65	15/10	50	-	50	1070	54	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH,
	MISSISSIPPIAN ASSOCIATED	37	25/10	25	-	25	1130	28	
HACKETT	BASAL BLAIRMORE	62	10/10	50	-	50	1100	55	
HAIRY HILL	VIKING	1	25/5	1	-	1	980	1	GAS SOLD TO WESTERN MINERALS LTD. PLANT,
	BLAIRMORE	23	10/5	20	5	15	1000	15	

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

FIELD OR AREA

HAMELIN CREEK

HAMILTON LAKE

HARMATTAN EAST

HARMATTAN-ELKTON

HEART RIVER

HERCULES

HEPERO

HOLBORNE

HOLMBERG

ZONE

CADOTTE
GETHING
CADOMIN

VIKING NON-
ASSOCIATED AND
ASSOCIATED

BLAIRMORE
MISSISSIPPIAN
ASSOCIATED
MISSISSIPPIAN
SOLUTION

MISSISSIPPIAN
MISSISSIPPIAN
ASSOCIATED
MISSISSIPPIAN
SOLUTION
LEDUC

CADOTTE
NOTIKWIN

VIKING
BLAIRMORE

BASAL BLAIRMORE
JURASSIC
MISSISSIPPIAN
LEDUC ASSOCIATED

CARDIUM
BLAIRMORE

BLAIRMORE

INITIAL
GAS IN PLACE
BCF

3
4
21

12

4
1200
150

69
1300
170
83

2
2

19
29

1
2
4
6

6
25

25

LOSSES
RESERVOIR/SURFACE
PER CENT

20/5
15/5
15/5

15/5

20/10
10/15
35/20

10/20
10/20
35/20
10/60

15/5
10/5

15/5
10/5

25/10
10/10
10/10
10/20

25/5
20/10

15/5

INITIAL
MARKETABLE
GAS
BCF

2
3
17

10

3
900
80

50
900
88
30

2
2

15
25

1
2
3
4

4
18

20

MARKETABLE GAS
PRODUCED TO
SEPT. 30, 1963
BCF

-
-
3

-

-
-3
10

1
-18
22
-

-
-

-
-

-
-

-
-

-

REMAINING
MARKETABLE
GAS AT
1000 BTU
PER CU.FT.
BCF

2
3
14

10

3
903
70

49
918
66
30

2
2

15
25

1
2
3
4

4
18

20

ESTIMATED
HEATING
VALUE
BTU PER
CU. FT.

1000
1010
1060

1040

1020
1080
1280

1040
1080
1280
1100

1000
1000

1050
960

1130
1130
1100
1150

980
1120

1050

REMARKS

SUPPLIES LOCAL UTILITY.

PRESENTLY CONSIDERED
BEYOND ECONOMIC
REACH.

(

INJECTED INTO GAS CAP.

INJECTED INTO GAS CAP.

RESERVOIR BEING CYCLED.

INJECTED INTO GAS CAP.

SUPPLIES LOCAL UTILITY.

PRESENTLY CONSIDERED
BEYOND ECONOMIC
REACH.

PRESENTLY CONSIDERED
BEYOND ECONOMIC
REACH.

GAS SOLD TO BAROID
OF CANADA, LTD. PLANT.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS.
HOMEGLLEN-RIMBEY	LEDUC LEDUC ASSOCIATED AND SOLUTION	10 1000	10/15 10/15	8 790	- 71	8 719	1080 1080	9 777	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED AND ALBERTA AND SOUTHERN GAS CO. LTD.
HUNTER VALLEY	MISSISSIPPIAN	140	10/20	100	-	100	1080	108	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
HUSSAR	BELLY RIVER VIKING BASAL COLORADO BLAIRMORE	6 56 130 480	30/5 25/5 20/5 10/5	4 40 100 410	- 1 21 39	4 39 79 371	1000 1040 1040* 1040*	4 41 82 386	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
INLAND	VIKING	21	25/5	15	-	15	980	15	
INNISFAIL	MISSISSIPPIAN WABAMUN LEDUC ASSOCIATED LEDUC SOLUTION	22 4 17 210	10/10 15/15 10/35 40/40	18 3 10 75	- - - 12	18 3 10 63	1080 1170 1020 1110*	19 4 10 70	
JARVIE	VIKING BLAIRMORE	9 7	20/5 10/5	7 6	- -	7 6	1040 1100	7 7	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
JENNER	BOW ISLAND BASAL COLORADO BLAIRMORE	4 4 11	25/5 10/5 15/5	3 3 9	- - -	3 3 9	990 1040 1050	3 3 9	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
JOARCAM	VIKING ASSOCIATED	66	20/5	50	-	50	1040	52	
JOFFRE	VIKING BASAL BLAIRMORE NISKU SOLUTION	1 26 100	25/5 20/5 40/40	1 20 36	- - -	1 20 36	1000 1020 1260	1 20 45	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
JUDY CREEK	VIKING BEAVERHILL LAKE SOLUTION	13 630	20/5 55/30	10 200	- -	10 200	1020 1080	10 216	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
JUMPING POUND	MISSISSIPPIAN	820	15/17	580	170	410	1050	437	GAS SOLD TO CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
JUMPING POUND WEST	MISSISSIPPIAN	150	15/20	100	-	100	1050	105	
KAYBOB	NOTTKEWIN GETHING CADOMIN WINTERBURN BEAVERHILL LAKE SOLUTION	300 12 99 5 210	15/5 10/5 15/5 15/35 35/25	240 10 80 3 100	14 - - - -	226 10 80 3 100	1020 1050 1040 1070 1140	231 11 83 3 114	GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD.
KAYBOB SOUTH	VIKING CADOMIN TRIASSIC NISKU BEAVERHILL LAKE	20 37 3 1 24	20/5 15/5 20/5 20/5 10/30	15 30 2 1 15	- - - - -	15 30 2 1 15	1100 1040 1160 1240 1210	17 31 2 1 18	FORMERLY CALLED TONY CREEK AREA.
KESSLER	VIKING MANNVILLE	70 5	25/5 10/5	50 4	2 -	48 4	990 990	48 4	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
KEVISVILLE	BLAIRMORE MISSISSIPPIAN	13 1	15/10 20/10	10 1	- -	10 1	1000 1000	10 1	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
KILLAM	VIKING BLAIRMORE	4 9	25/5 15/5	3 7	- -	3 7	1040 1000	3 7	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
KIRKCALDY	BASAL MANNVILLE MISSISSIPPIAN	20 39	20/5 15/10	15 30	- -	15 30	1000 1010	15 30	
KNELLER	BLAIRMORE	12	10/5	10	-	10	1100	11	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
LAC LA BICHE	VIKING	14	25/5	10	-	10	1010	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	BLAIRMORE	17	20/5	13	-	13	1010	13	SUPPLIES LOCAL UTILITY.

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LAMBERT CREEK	WABAMUN	15	25/10	10	-	10	1050	11	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
LEAHURST	BLAIRMORE	9	10/5	8	1	7	1100	8	SUPPLIES LOCAL UTILITY.
LEDUC-WOODBEND	VIKING	20	20/5	15	2	13	1070	14	INJECTED INTO NISKU AND LEDUC GAS CAPS.
	BASAL BLAIRMORE	85	20/5	65	10	55	1180	65	
	NISKU ASSOCIATED	37	10/15	28	-4	32	1180	38	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED.
	NISKU SOLUTION	140	25/30	72	60	12	1180	14	
	LEDUC ASSOCIATED	420	15/15	300	-23	323	1180	381	
LINDBERGH	LEDUC SOLUTION	230	50/30	80	60	20	1180	24	
	VIKING	3	35/5	2	-	2	990	2	SUPPLIES SALT PLANT.
LLOYDMINSTER	BLAIRMORE	18	20/5	14	4	10	1100	11	
	BLAIRMORE	40	50/30	14	11	3	950	3	SUPPLIES LOCAL UTILITY.
LONE PINE CREEK	BASAL BLAIRMORE	4	10/10	3	-	3	1020	3	
	WABAMUN	160	20/20	100	-	100	1030	103	
LOOKOUT BUTTE	MISSISSIPPIAN	550	15/15	400	2	398	1040	414	RESERVOIR BEING CYCLED.
LOVETT RIVER	BLAIRMORE	12	10/5	10	-	10	1040	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	MISSISSIPPIAN	86	10/10	70	-	70	1040	73	
MAJEAU LAKE	BLAIRMORE	3	20/5	2	-	2	1000	2	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	MISSISSIPPIAN	12	10/10	10	-	10	1070	11	
MANYBERRIES	BOW ISLAND	42	20/5	32	16	16	940	15	GAS SOLD TO CANADIAN- MONTANA GAS COMPANY LTD.
MARTEN HILLS	PELICAN	2	40/5	1	-	1	990	1	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	WABISKAW	56	25/5	40	-	40	990	40	
	WABAMUN	140	25/5	100	-	100	1000	100	
MAZEPPA	MISSISSIPPIAN	20	10/15	15	-	15	1060	16	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.

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FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
MEDICINE HAT	MEDICINE HAT BOW ISLAND ELLIS	2500 20 25	25/5 25/5 15/5	1750 15 20	300 - -	1450 15 20	950* 970 1000	1378 15 20	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED, MANY ISLANDS PIPE LINES LIMITED AND LOCAL SUPPLY.
MEDICINE RIVER	BLAIRMORE JURASSIC JURASSIC ASSOCIATED MISSISSIPPIAN ASSOCIATED	33 8 8 5	15/10 15/10 15/10 10/10	25 6 6 4	- - - -	25 6 6 4	1150 1020 1020 1100	29 6 6 4	
MILLET	BLAIRMORE	21	20/10	15	-	15	1020	15	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
MINNEHICK-BUCK LAKE	BLAIRMORE MISSISSIPPIAN	6 650	25/5 10/15	4 500	- 20	4 480	1000 1090	4 523	GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD.
MOOSE MOUNTAIN	MISSISSIPPIAN	67	10/25	45	-	45	1000	45	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
MORINVILLE	VIKING BLAIRMORE	3 140	25/5 15/5	2 110	- 35	2 75	1000 1070*	2 80	GAS SOLD TO CANADIAN INDUSTRIAL GAS LIMITED AND LOCAL SUPPLY.
MORLEYVILLE	MISSISSIPPIAN	69	10/20	50	-	50	1050	53	
MOUNTAIN PARK	TRIASSIC	29	10/5	25	-	25	1090	27	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
NEVIS	BLAIRMORE DEVONIAN	65 740	15/10 10/20	50 530	- 58	50 472	1000 990*	50 467	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.

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NORDEGG	TRIASSIC MISSISSIPPIAN	9 25	10/10 10/10	7 20	- -	7 20	1000 1000	7 20	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
NORMANDVILLE	GETHING TRIASSIC MISSISSIPPIAN	15 4 31	15/5 15/5 15/5	12 5 25	- - 1	12 3 24	980 1090 1050	12 3 25	SUPPLIES LOCAL UTILITY.
OBED	MISSISSIPPIAN	12	10/10	10	-	10	1040	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
OVERLIN	BLAIRMORE	3	20/5	2	1	1	1090	1	SUPPLIES LOCAL UTILITY.
OKOTOKS	WABAMUN	420	10/60	150	17	133	1000	133	GAS SOLD TO CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
OLDS	WABAMUN	280	10/20	200	-	200	1050	210	
DYEN	VIKING DETITAL	43 4	15/5 15/5	35 3	3 -	32 3	960* 1140	31 3	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
PADDLE RIVER	JURASSIC MISSISSIPPIAN	190 30	25/10 25/10	130 20	- -	130 20	1070 1060	139 21	
PAKOWKI LAKE	BOW ISLAND	14	25/5	10	2	8	940	8	GAS SOLD TO CANADIAN- MONTANA GAS COMPANY LTD.
PARKLAND NORTH- EAST	MISSISSIPPIAN	21	15/15	15	-	15	1010	15	
PEMBINA	BELLY RIVER BELLY RIVER SOLUTION CARDIUM SOLUTION VIKING BLAIRMORE	94 48 3100 11 210	10/5 40/65 60/35 10/5 10/10	80 10 800 9 170	- 2 150 - 6	80 8 650 9 164	1180 1180 1170 1100 1120	94 9 761 10 184	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED. GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD.
	NORDEGG MISSISSIPPIAN	18 13	10/5 10/15	15 10	- -	15 10	1050 1050	16 11	

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PENDANT D'OUREILLE	BOW ISLAND MANNVILLE	180 25	20/5 15/5	140 20	71 4	69 16	940 1000	65 16	GAS SOLD TO CANADIAN- MONTANA GAS COMPANY LTD.
PENHOLD	VIKING	14	10/5	12	-	12	1020	12	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
PHIL CAN	GETHING MISSISSIPPIAN	12 5	20/5 15/5	9 4	- -	9 4	980 1050	9 4	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
PINCHER CREEK	MISSISSIPPIAN	1800	25/25	1000	170	830	1030*	855	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
PINE CREEK	WABAMUN LEDUC	100 1400	10/50 10/40	45 750	- 29	45 721	1050* 1050*	47 757	GAS USED TO PRESSURE MAINTAIN WINDFALL FIELD.
PLAIN LAKE	VIKING BLAIRMORE	3 28	25/5 20/5	2 21	- -	2 21	980 1000	2 21	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
POUCE COUPE	PEACE RIVER CADOMIN	140 12	15/5 15/5	110 10	55 -	55 10	1000 1060	55 11	GAS SOLD TO WESTCOAST TRANSMISSION COMPANY LIMITED.
POUCE COUPE SOUTH	PEACE RIVER GETHING JURASSIC TRIASSIC	110 14 1 25	15/5 10/5 25/10 15/5	90 12 1 20	37 7 - -	53 5 1 20	1040 1000 1070 1090	55 5 1 22	GAS SOLD TO WESTCOAST TRANSMISSION COMPANY LIMITED AND PEACE RIVER TRANSMISSION CO. LTD.
PRÉVO	MISSISSIPPIAN	37	10/10	30	3	27	1100	30	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
PRINCESS	SECOND SPECKS BOW ISLAND BASAL COLORADO BASAL BLAIRMORE MISSISSIPPIAN JEFFERSON	28 7 39 160 8 44	25/5 20/5 20/5 15/5 20/5 20/15	20 5 30 130 6 30	- - 1 13 - -	20 5 29 117 6 30	1000 1010 1010* 1010* 1030 1030	20 5 29 118 6 31	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.

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PROVOST	VIKING BLAIRMORE	710 19	20/5 15/5	540 15	100 -	440 15	1000* 1000	440 15	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
RAVEN RIVER	VIKING BASAL BLAIRMORE MISSISSIPPIAN	19 4 26	25/10 15/10 10/15	13 3 20	- - -	13 3 20	1020 1050 1070	13 3 21	
REDLAND	VIKING BLAIRMORE	19 20	15/5 20/5	15 15	- -	15 15	1000 1050	15 16	
REDWATER	VIKING LEDUC SOLUTION	14 220	25/5 40/65	10 46	- 26	10 20	1040 1220	10 24	GAS SOLD TO MID- WESTERN INDUSTRIAL GAS LTD.
RED WILLOW	VIKING BASAL BLAIRMORE	13 8	20/5 20/10	10 6	- -	10 6	1020 1100	10 7	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
RETLOW	BOW ISLAND BASAL COLORADO BASAL BLAIRMORE	3 3 42	25/5 25/5 20/10	2 2 30	- - -	2 2 30	950 1020 1000	2 2 30	
RICH	BASAL BLAIRMORE	16	15/10	12	-	12	1100	13	
RICHDALE	VIKING BASAL BLAIRMORE	14 11	25/5 25/5	10 8	- -	10 8	1010 1050	10 8	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
ROCHESTER	VIKING BLAIRMORE WABAMUN	5 27 6	20/5 25/5 10/5	4 19 5	- - -	4 19 5	1000 1000 1070	4 19 5	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
ROLLING HILLS	BOW ISLAND BASAL COLORADO	31 12	15/5 15/5	25 10	- -	25 10	970 1030	24 10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
ROSEBUD	VIKING	26	20/5	20	-	20	1000	20	
ROWLEY	VIKING MANNVILLE MISSISSIPPIAN ASSOCIATED	29 9 49	10/5 10/5 10/10	25 8 40	- - -	25 8 40	1040 1050 1080	26 8 43	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.

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RYCROFT	GETHING	16	15/5	13	2	11	1040	11	SUPPLIES LOCAL UTILITY.
ST. ALBERT-BIG LAKE	VIKING BLAIRMORE	3 150	20/5 15/5	2 120	- 46	2 74	1070* 1070*	2 79	GAS SOLD TO CANADIAN INDUSTRIAL GAS LIMITED.
ST. BRIDES	BLAIRMORE	26	20/5	20	-	20	940	19	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
ST. PAUL	BLAIRMORE	5	20/5	4	3	1	1010	1	SUPPLIES LOCAL UTILITY.
SADDLE HILLS	PEACE RIVER GETHING PERMO-PENN	41 4 23	10/5 15/5 10/5	35 3 20	- - -	35 3 20	1020 980 1030	36 3 21	
SAMSON	BASAL BLAIRMORE ASSOCIATED AND NON-ASSOCIATED	19	20/10	14	3	11	1040	11	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED.
SARGE	MISSISSIPPIAN	180	10/20	130	8	122	1050	128	GAS SOLD TO CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
SAVANNA CREEK	MISSISSIPPIAN	590	10/25	400	10	390	1020	398	GAS SOLD TO WESTCOAST TRANSMISSION COMPANY LIMITED.
SEDALIA	VIKING BLAIRMORE	130 1	20/5 25/5	100 1	2 -	98 1	1010* 1010	99 1	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
SIBBALD	VIKING BASAL COLORADO	59 13	20/5 20/5	45 10	5 -	40 10	960* 970	38 10	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
STEU RIVER	BLAIRMORE	12	15/5	10	-	10	1000	10	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

FIELD OR AREA

STURGEON LAKE SOUTH
GENERAL AREAGETHING
CADOMIN
TRIASSIC
PERMO-PENNINITIAL
GAS IN PLACE
BCFLOSSES
RESERVOIR/SURFACE
PER CENTINITIAL
MARKETABLE
GAS
BCFMARKETABLE GAS
PRODUCED TO
SEPT. 30, 1963
BCFREMAINING
MARKETABLE GAS
TO
SEPT. 30, 1963
BCFESTIMATED
HEATING
VALUE
BTU PER
CU. FT.REMAINING
MARKETABLE
GAS AT
1000 BTU
PER CU. FT.
BCF

REMARKS

PRESENTLY CONSIDERED
BEYOND ECONOMIC
REACH,

SUPPLIES LOCAL UTILITY.

SUNDRE

VIKING
BASAL BLAIRMORE
MISSISSIPPIAN
MISSISSIPPIAN
ASSOCIATED
MISSISSIPPIAN
SOLUTION

SUFFIELD

MILK RIVER
SECOND SPECKS

SWALWELL

MISSISSIPPIAN

SWAN HILLS

GETHING
BEAVERHILL LAKE
SOLUTION

SYLVAN LAKE

EDMONTON
BLAIRMORE
JURASSIC
MISSISSIPPIAN
LEDUC

TANGENT

CADOTTE
GETHING
TRIASSIC

THREE HILLS CREEK

BELLY RIVER
VIKING
MISSISSIPPIAN
LEDUC

A-24

GAS INJECTED INTO GAS
CAP.GAS SOLD TO NORTH-
WESTERN UTILITIES,
LIMITED.GAS SOLD TO TRANS-
CANADA PIPE LINES
LIMITED.

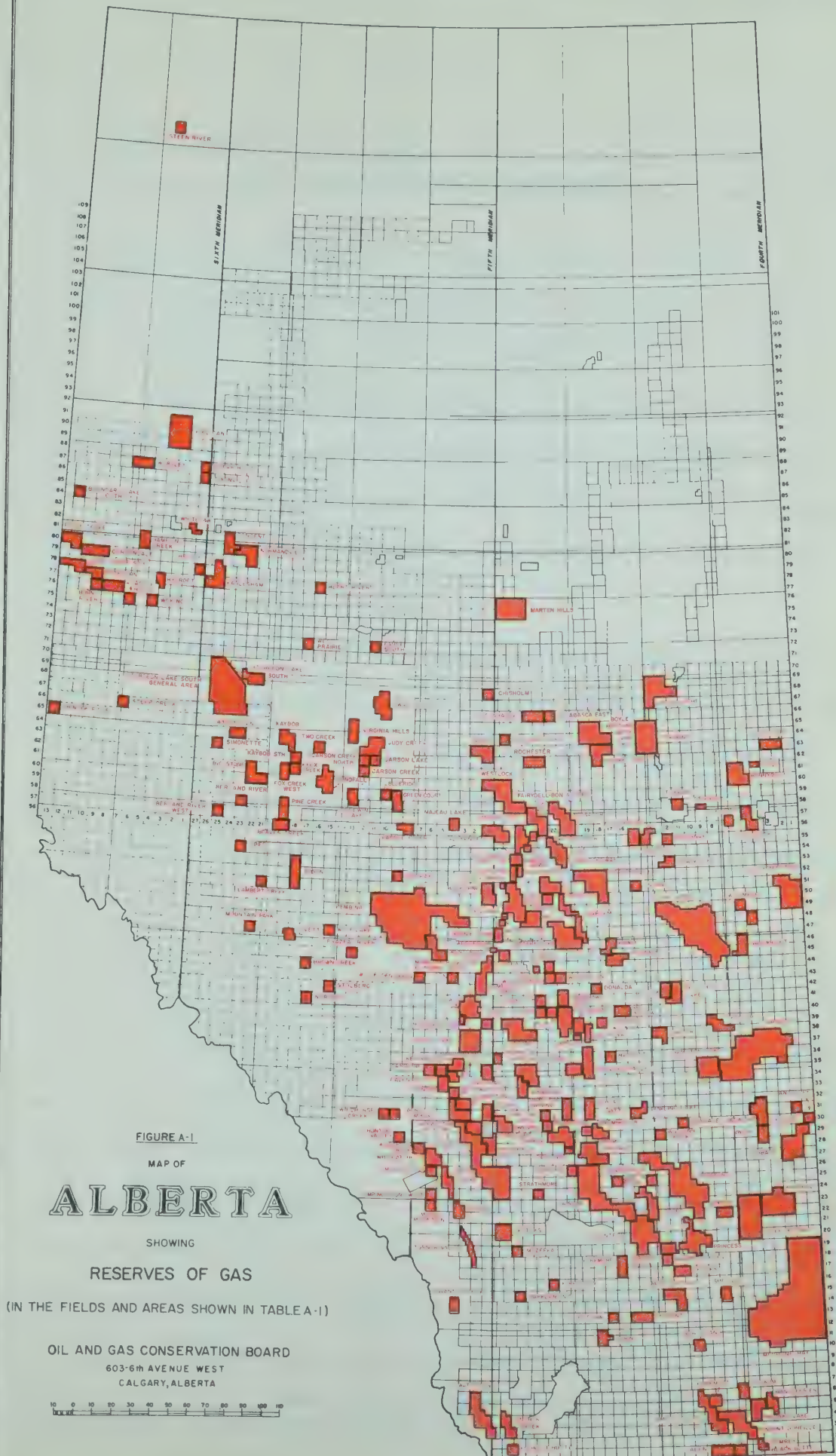
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TURIN	BOW ISLAND	11	20/5	8	-	8	970	8	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	BASAL BLAIRMORE	21	10/5	18	-	18	1020	18	
	ELLIS	5	15/5	4	-	4	1070	4	
	MISSISSIPPIAN	3	15/10	2	-	2	1050	2	
TURNER VALLEY	MISSISSIPPIAN	1500	10/70	410	260	150	1110	167	GAS SOLD TO CANADIAN WESTERN NATURAL GAS COMPANY LIMITED AND LOCAL UTILITY.
	ASSOCIATED MISSISSIPPIAN SOLUTION	1400	45/55	350	280	70	1110	78	
TWINING	BASAL BLAIRMORE	7	20/5	5	-	5	1120	6	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
	MISSISSIPPIAN	25	10/10	20	-	20	1100	22	
TWO CREEK	TRIASSIC	12	10/5	10	-	10	1090	11	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
USONA	BLAIRMORE	12	10/5	10	-	10	1110	11	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
VERGER	BASAL COLORADO	3	25/5	2	-	2	1060	2	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED AND SUPPLIES LOCAL UTILITY.
	BASAL MANVILLE	39	20/5	30	-	30	1050	32	
	MISSISSIPPIAN	4	15/10	3	-	3	1070	3	
VIKING-KINSELLA	VIKING	1100	25/5	770	350	420	990	416	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED AND SUPPLIES LOCAL UTILITY.
	BLAIRMORE DEVONIAN	29 11	20/5 20/5	22 8	8 2	14 6	1000 1010	14 6	
VIRGINIA HILLS	BLAIRMORE	9	10/5	8	-	8	1040	8	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED AND SUPPLIES LOCAL UTILITY.
	TRIASSIC	20	15/10	15	-	15	1160	17	
	BEAVERHILL LAKE	210	55/35	62	-	62	1120	69	
	SOLUTION SLAVE POINT	3	25/20	2	-	2	1070	2	
WAINWRIGHT	VIKING	5	15/5	4	-	4	980	4	GAS SOLD TO NORTH- WESTERN UTILITIES, LIMITED AND SUPPLIES LOCAL UTILITY.
	BLAIRMORE ASSOCIATED AND NON-ASSOCIATED	33	20/5	25	7	18	940	17	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
WAPAROUS CREEK	MISSISSIPPIAN	69	10/20	50	-	50	1070	54	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
WASKAHGAN	DUNVEGAN	25	10/10	20	-	20	1100	22	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
WATERGLEN	BLAIRMORE LEDUC	7 10	15/10 10/20	5 7	- -	5 7	1100 1100	6 8	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
WATERTON	MISSISSIPPIAN DEVONIAN	1600 280	15/50 10/20	700 200	23 2	677 198	1020 1020	691 202	GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD.
WATTS	VIKING MISSISSIPPIAN	3 1	20/5 20/5	2 1	1 -	1 1	1040 1070	1 1	SUPPLIES LOCAL UTILITY.
WAYNE-ROSEDALE	BELLY RIVER VIKING BLAIRMORE	7 170 220	20/5 20/5 15/5	5 130 180	- 6 8	5 124 172	1000 1100* 1100*	5 136 189	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED AND SUPPLIES LOCAL UTILITY.
WEST DRUMHELLER	BASAL BLAIRMORE NITSKU ASSOCIATED	12 9	15/5 10/15	10 7	- -	10 7	1100 1090	11 8	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
WESTEROSE	BLAIRMORE LEDUC ASSOCIATED LEDUC SOLUTION	7 130 130	20/5 10/20 30/20	5 90 73	- -7 9	5 97 64	1020 1070 1100	5 104 70	GAS INJECTION INTO GAS CAP.
WESTEROSE SOUTH	WABAMUN LEDUC	7 1700	10/10 10/15	6 1300	- 110	6 1190	1090 1090	7 1297	GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD. AND TRANS-CANADA PIPE LINES LIMITED.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING MARKETABLE GAS AT 1000 BTU PER CU. FT. BCF	REMARKS
WESTLOCK	VIKING BASAL BLAIRMORE	310 4	15/5 20/5	250 3	4 -	246 3	1040 1100	256 3	GAS SOLD TO CANADIAN INDUSTRIAL GAS LIMITED AND SUPPLIES LOCAL UTILITY.
WEST PRAIRIE	CADOTTE BLUESKY	18 6	10/5 10/5	15 5	- -	15 5	1040 990	16 5	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
WESTWARD HO	VIKING BLAIRMORE MISSISSIPPIAN SOLUTION	11 4 28	20/10 20/10 35/45	8 3 10	- - -	8 3 10	1020 1020 1130	8 3 11	
WHITELAW	GETHING TRIASSIC	31 33	15/5 20/5	25 25	4 -	21 25	1020 1090	21 27	SUPPLIES LOCAL UTILITY.
WILDCAT HILLS	MISSISSIPPIAN	830	10/20	600	22	578	1080	624	GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD.
WILDHORSE CREEK	MISSISSIPPIAN	130	10/15	100	-	100	940	94	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
WILDMERE	BLAIRMORE	22	20/5	17	8	9	960	9	SUPPLIES LOCAL UTILITY.
WILDUNN CREEK	VIKING	35	25/5	25	-	25	1010	25	
WILLESDEN GREEN	BELLY RIVER CARDIUM CARDIUM SOLUTION BASAL BLAIRMORE	4 12 270 20	20/5 20/5 77/35 10/15	3 9 40 15	- - - -	3 9 40 15	1000 1100 1100 1100	3 10 44 17	
WILLINGDON	VIKING MANNVILLE LEDUC	3 15 11	25/5 25/5 10/5	2 11 9	- 1 4	2 10 5	980 990 990	2 10 5	GAS SOLD TO WESTERN MINERALS LTD. PLANT.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FIELD OR AREA	ZONE	INITIAL GAS IN PLACE BCF	LOSSES RESERVOIR/SURFACE PER CENT	INITIAL MARKETABLE GAS BCF	MARKETABLE GAS PRODUCED TO SEPT. 30, 1963 BCF	REMAINING MARKETABLE GAS TO SEPT. 30, 1963 BCF	ESTIMATED HEATING VALUE BTU PER CU. FT.	REMAINING GAS AT 1000 BTU PER CU.FT. BCF	REMARKS
WIMBORNE	VIKING	1	25/5	1	-	1	1020	1	
	MISSISSIPPIAN	1	10/10	1	-	1	1100	1	
	NISKU	3	20/15	2	-	2	1160	2	
	LEDUC ASSOCIATED	290	10/30	180	2	178	1000	178	PRODUCED WITH OIL,
	LEDUC SOLUTION	73	45/65	14	-	14	1000	14	
WINDFALL	VIKING	13	25/5	9	-	9	1030	9	
	MISSISSIPPIAN	5	15/5	4	-	4	1040	4	
	LEDUC	820	10/35	480	-	480	1050*	504	RESERVOIR BEING CYCLED, GAS SOLD TO ALBERTA AND SOUTHERN GAS CO. LTD. PRESSURE MAINTAINED BY PINE CREEK GAS.
WIZARD LAKE	VIKING	1	15/5	1	-	1	1070	1	GAS SOLD TO NORTH-
	BLAIRMORE	18	20/15	12	7	5	1120	6	WESTERN UTILITIES, LIMITED.
	LEDUC SOLUTION	220	40/25	100	15	85	1250	106	
WOKING	PEACE RIVER	5	10/5	4	-	4	1040	4	
	SPIRIT RIVER	3	20/5	2	-	2	1040	2	PRESENTLY CONSIDERED
	BLUESKY	4	20/5	3	-	3	1040	3	BEYOND ECONOMIC
	PERMO-PENN	3	20/5	2	-	2	1060	2	REACH.
	MISSISSIPPIAN	3	25/5	2	-	2	1070	2	
WOLF LAKE	CADOMIN	13	10/5	11	-	11	1060	12	PRESENTLY CONSIDERED BEYOND ECONOMIC REACH.
WOOD RIVER	BASAL BLAIRMORE	37	10/10	30	2	28	1090*	31	GAS SOLD TO TRANS- CANADA PIPE LINES LIMITED.
WORSLEY	LEDUC	270	15/5	220	11	209	1070	224	GAS SOLD TO WESTCOAST TRANSMISSION COMPANY LIMITED AND SUPPLIES LOCAL UTILITY.
WITHIN ECONOMIC REACH				33145	3648	29497		31187	
BEYOND ECONOMIC REACH				2789		2789		2893	
OTHER RESERVES LESS THAN 10 Bcf	(WITHIN ECONOMIC REACH) (BEYOND ECONOMIC REACH)			41 912		41 912		43 963	
TOTAL RESERVES, SEPTEMBER 30, 1963.				36887		33239		35086	

*MEASURED HIGHER HEATING VALUE.



APPENDIX B

THE TREND IN EXPLORATION FOR AND THE GROWTH OF GAS RESERVES IN ALBERTA

The Board published an assessment of the trends in exploration and growth of gas reserves in Alberta in its report on reserves as of December, 1962⁽¹⁾. This report indicated a long term average growth in initial marketable reserves (due both to new discoveries and to appreciation of known reserves) of 2.6 trillion cubic feet per year. Actually the growth rate for 1962 itself was below this average at about 1.7 trillion cubic feet.

The Board has reviewed and updated this 1962 study in the light of the experience of the first nine months of 1963 and the evidence concerning growth trends submitted at the hearing. Except for Figures B-1 and B-2, the revisions of the Tables and Figures shown in the 1962 study are not presented at this time.

The September 30, 1963, reserve estimate indicated a growth in initial marketable gas since December 31, 1962, of 1.4 trillion cubic feet or at the rate of 1.9 trillion cubic feet per year. This also is below the long term average and depresses this average to about 2.5 trillion cubic feet per year. The average growth rate for the last two years has been 1.8 trillion cubic feet per year. The data on which the growth rates were calculated are shown in Figure B-1 which also

(1) Reserves of Gas, Natural Gas Liquids, Crude Oil and Sulphur of the Province of Alberta as of December 31, 1962.

illustrates the long term rate.

The 1.4 trillion cubic feet growth in the first nine months of 1963 was composed of 105 billion cubic feet of new reserves and 1.3 trillion cubic feet appreciation of previously discovered reserves. The new reserves resulted from the drilling of 389 wildcat wells and represent discoveries at the rate of 0.3 trillion cubic feet per wildcat well. From Figure B-2 it is clear that this result is much below the long term average and even below the relatively low figures of recent years. Recognition of the fact that the figures for recent years will be subject to appreciation improves the picture somewhat but the downward trend, which had appeared to be arrested in 1961 and reversed in 1962, is again indicated. This has been a matter of concern to the Board as it was to the applicant and the interveners.

The Board, like Mr. Horte of Trans-Canada, has asked itself how the reduction in new reserves discovered per wildcat well drilled may be explained and particularly if the reduced figures really are representative of what may be expected in the future. Mr. Horte, Mr. Nicholson of California Standard, Mr. Blair of Alberta and Southern and Mr. Denny of Pan American all contended that the lower reserve growth per wildcat well was due to a lack of market incentive in recent years which, while apparently not resulting in a decrease in overall exploratory activity, did result in very little development of successful gas strikes and hence in the low reserves presently

assigned. In other words, these witnesses say that when market opportunities again improve there will be substantial appreciation of the strikes of the last few years - presumably they would expect appreciation beyond that which the Board considers "normal". This argument was further supported by evidence of Mr. Horte to the effect that of the wildcat wells drilled over recent years a high and even increasing proportion resulted in gas discoveries. Mr. Horte also demonstrated that development and appreciation of reserves discovered was high in fields connected to a market but low in other fields. Since most of the reserves discovered over the past few years are not connected to a market, this would affect not only the discoveries of 1963 but even more the appreciation of some of the earlier discoveries. Only Mr. Willson of Northwestern Utilities and Canadian Western did not offer an explanation for the declining growth rate. He referred to the decline and argued that because of it the Board should discontinue its practice of counting upon the growth in reserves expected over two years as part of the supply to meet future requirements.

The Board agrees in principle with the views expressed by Mr. Horte, Mr. Blair, Mr. Nicholson and Mr. Denny but is not sure what part of the decline may properly be attributed to lack of market incentive. It has commenced further studies in an attempt to assess this effect more closely.

Meanwhile, and for the purpose of consideration of the Trans-Canada application, the Board is completely satisfied

that much more gas will be discovered in Alberta, and that it may safely count upon growth in reserves over the next two years at the rate of the past two years. This amounts to some 3.6 trillion cubic feet in the two-year period.

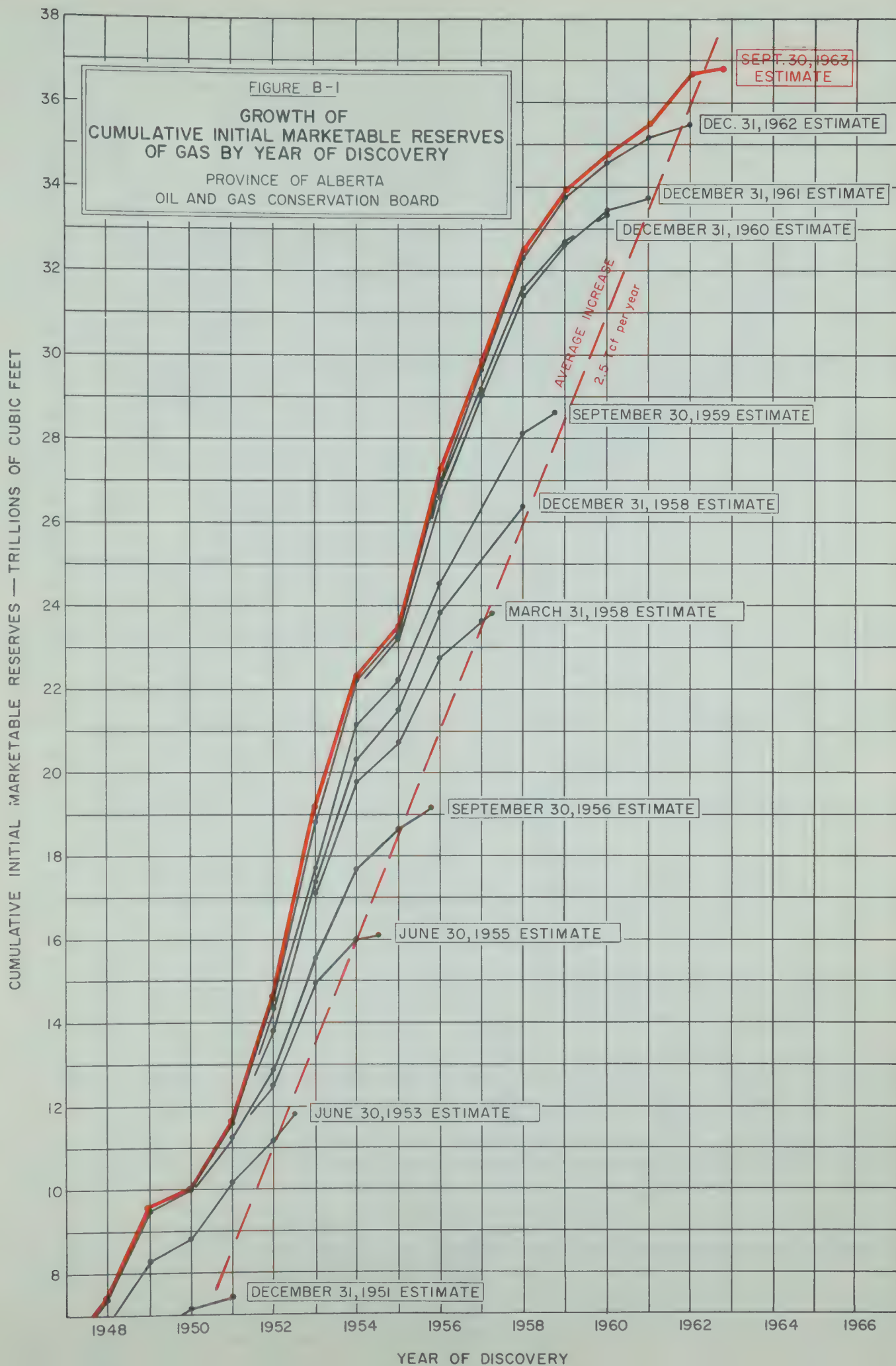
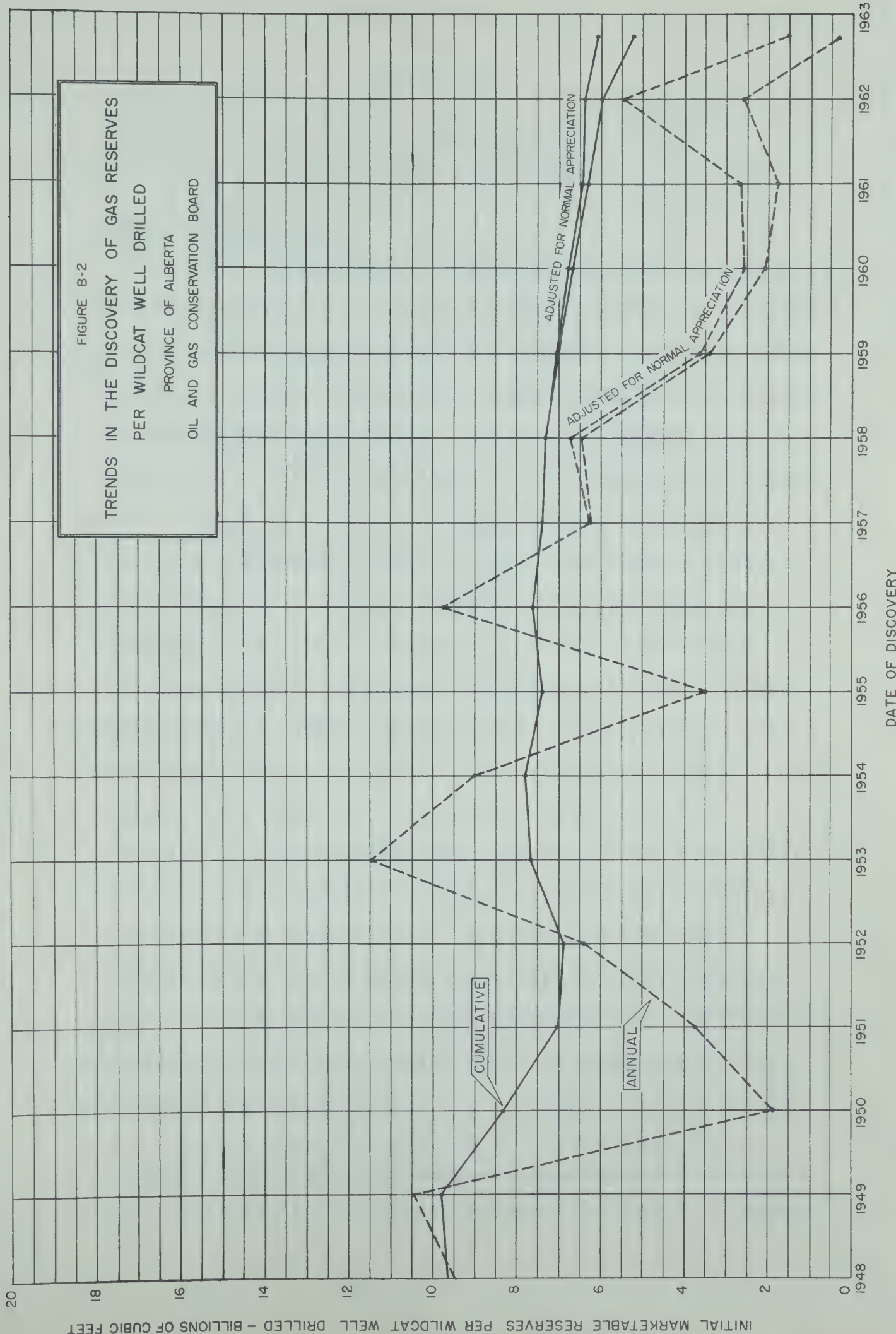


FIGURE B-2
TRENDS IN THE DISCOVERY OF GAS RESERVES
PER WILDCAT WELL DRILLED
PROVINCE OF ALBERTA
OIL AND GAS CONSERVATION BOARD



APPENDIX C

ALBERTA GAS REQUIREMENTS AND PRESENT PERMIT COMMITMENTS

Alberta Requirements

Neither the applicant, Trans-Canada Pipe Lines Limited, nor the interveners presented detailed evidence concerning the quantity of gas that will be needed to meet the thirty-year requirements of Alberta. Trans-Canada indicated that the thirty-year requirements could be determined by extending for three years the 1959 assessment made by the Board. Mr. B. F. Willson of Northwestern Utilities, Limited and Canadian Western Natural Gas Company Limited also stated that this procedure would be satisfactory, commenting only that he believed the period should be taken as thirty years commencing January 1, 1964, rather than January 1, 1963, as proposed by the applicant. The Board felt, however, that as its last comprehensive review of the Province's gas requirements was that presented in the December, 1959, report to the Lieutenant Governor in Council,⁽¹⁾ a complete re-assessment of the requirements should be made. A new and independent forecast was made for the period, 1964 to 1993, and the Board has reviewed the Province's thirty-year requirements in light of the new forecast, and that presented in the December, 1959, report.

(1) Report to The Lieutenant Governor in Council, December, 1959.

The 1959 Forecast

The 1959 forecast figures for the period 1960 to 1963, the actual consumption for 1960 to 1962 and the presently estimated consumption for 1963 are reproduced below. All figures are adjusted to normal degree days and to a 1000 Btu per cubic foot basis. It is apparent that the 1959 forecast was high for all categories of use and particularly so for industrial use.

1959 Forecast Compared with Actual Sales 1960 - 1963

(Billions of Cubic Feet)

	<u>Domestic</u>	<u>Commercial</u>	<u>Industrial</u>	<u>Total</u>
1960 - Forecast	40.5	29.3	91.1	160.9
Actual	38.7	26.0	80.2	144.9
% Difference	4.7	12.7	13.6	11.0
1961 - Forecast	43.3	31.0	101.1	175.4
Actual	40.8	28.6	80.3	149.7
% Difference	6.1	8.4	25.9	17.2
1962 - Forecast	45.9	32.3	106.9	185.1
Actual	41.7	29.8	87.2	158.7
% Difference	10.1	8.4	22.6	16.6
1963 - Forecast	47.5	33.9	113.1	194.5
Est. Actual	43.0	30.8	90.5	164.3
% Difference	10.5	10.1	25.0	18.3

The 1963 Detailed Forecast

Separate forecasts have been made of domestic, commercial and industrial consumption for the area served by each utility system in the Province. Requirements were assessed in detail for the first five years of the forecast, taking account of the growth in population, the rate of household formation

and average annual consumption of gas per customer. Future requirements of large industries were projected individually. Historical rates of growth and the trends indicated by the five-year estimates in each utility's service area were used as the basis of projecting the long-term trend.

Domestic Requirements. The historical population growth of the Province was examined by rural and urban areas for each census division, and rates of future growth determined for the area served by each utility system. The growth rates, which varied from 4.5 per cent per year in large metropolitan areas to nil in some small communities, were used as a base in forecasting the number of domestic customers and the total domestic gas consumption. Allowances in the growth rate were made in the long-term forecast for the estimated saturation limits of the market relative to population and of the average annual consumption of gas per customer.

Commercial Requirements. A detailed Province-wide study was made to determine the relationship of commercial customers to domestic customers. A pattern was found to exist in the ratio of domestic to commercial customers which is related to the size of the community. In large centres the ratio is about 10:1, while in the small isolated communities there are some three domestic customers to every commercial customer. As the population of a

community grows, the commercial establishments increase in number at a lower rate, but they tend towards larger units.

Industrial Requirements. A forecast of the growth in demand was made for each large industrial consumer and for each group of small industrial consumers served by each utility system. Most of the large consumers were consulted, and forecasts of their future requirements were received from them.

In estimating industrial demand, consideration was given to the expected industrial growth of Canada, the growth characteristics of the product being manufactured, the growth record of the individual manufacturer, the markets available and changes in processes which may affect the consumption of gas.

In addition to increases in demand by existing industries, allowance was made for new, large industrial customers. The presence of lumber, petroleum and metallic mineral resources combined with reasonably priced energy, should be conducive to the establishment of new industries in the Province. Allowance was made for the establishment of several new major industries during the thirty-year period. A further 780 billion cubic feet of gas was considered as a requirement during the forecast period for the possible processing of iron ore in the Peace River area. This particular possible requirement was discussed

in detail in the Board's report of September, 1961, concerning the application of Westcoast Transmission Company Limited. Progress in the establishment of such an industry is slower than was anticipated in 1961 by proponents at that time. Nonetheless the Board believes there is a good possibility of the development of an iron ore industry within the forecast period.

The 1963 Overall Forecast

The new detailed forecast, prepared by categories of use and by major consuming areas, indicated stepwise increments for assumed new industries and otherwise reflected a degree of detail which the Board does not now believe justified. For this reason, and because of the widespread and anticipated further growth of the Alberta Gas Trunk Line system and the exchange agreements entered into between the major utilities and the major permittees, the Board has decided not to publish area by area forecasts of requirements and unless there is good reason to do otherwise, to restrict its published figures to an overall provincial forecast. Also the Board recognizes that it can never accurately forecast long term, year by year variations and believes it must be content to make long term projections on the basis of an average annual growth rate. It believes that the total thirty-year requirements may be estimated in this way as reliably as by a detailed forecast. Moreover the use

of a constant average annual growth rate facilitates the determination by formula-type calculation of the amount of gas needed to meet the requirement.

Having the above in mind the Board considered the results of its 1963 detailed forecast and compared them with a projection of its 1959 forecast, the latter having been accepted by the applicant and the interveners and not questioned at the hearing. The 1963 detailed forecast, while starting from a lower level in 1963 than did the 1959 forecast, indicated a higher level in 1993 and a somewhat greater total thirty-year requirement. Having regard to the two forecasts, the Board arrived at rates of growth and terminal year consumption for the Province as a whole, as shown below:

	<u>1963 Annual</u>	<u>1993 Annual</u>	<u>Growth Rate (1)</u>
Domestic	43.0	90.5	2.5
Commercial	30.8	55.8	2.0
Industrial	90.5	341.7	4.6
Total	164.3	488.0	3.7

(1) Equivalent constant annual growth rate, per cent per year.

Applying the summation factors corresponding to the relevant growth rates (taken from and explained in the Board's report of September, 1958⁽²⁾) and the appropriate

(2) Report to the Lieutenant Governor in Council with Respect to Applications under The Gas Resources Preservation Act 1956. September, 1958.

load factors, the total requirements for the thirty-year period and the terminal year peak are estimated to be:

	<u>Summation Factor</u>	<u>Requirement</u>	<u>1993 Peak Day</u>
Domestic	43.8	1885	
Commercial	40.5	1248	
Industrial	62.0	5607	
Total	53.2	8740	2300

These figures represent the Board's best current estimate of the thirty-year requirements for a period commencing October 1, 1963, and terminating September 30, 1993.

Although the forecasts were based on calendar years, the Board believes that the difference in total requirements based on a September 30 year-end would be insignificant. The total requirement of 8.74 trillion cubic feet compares with the requirement estimated in 1959 (for a thirty-year period commencing January 1, 1960) of 8.4 trillion cubic feet.

Permit Commitments

The present permit commitments, the volumes of gas removed to September 30, 1963, and the maximum daily authorized withdrawal rates, under authority of each of the 29 permits issued, are shown in Table C-1.

At September 30, 1963, some 14.0 trillion cubic feet of gas had been authorized for export. At this date 1.6 trillion cubic feet or 11.4 per cent had been removed.

TABLE C-1
 PERMIT COMMITMENTS
 (ALL VOLUMES AT 14.65 PSIA AND 60°F)

PERMIT NUMBER	PERMITTEE	FIELDS UNDER PERMIT	PERMITTED WITHDRAWALS		TOTAL Bcf	WITHDRAWN TO SEPTEMBER 30, 1963 Bcf	REMAINING AUTHORIZED WITHDRAWAL Bcf
			MAXIMUM DAY MMcf	MAXIMUM ANNUAL Bcf			
AS 59-1 AND AS 60-2	ALBERTA AND SOUTHERN GAS CO. LTD.	BEAVER CREEK, BERLAND RIVER, BRAZEAU RIVER, BURNT TIMBER, CAROLINE, CARSON CREEK, CARSON CREEK NORTH, CROSSFIELD (RUNDLE POOL), FOX CREEK, FOX CREEK NORTH, FOX CREEK WEST, HOMEGLEN-RIMBEY, KAYBOB, LOVETT RIVER, MINNEHIK-BUCK LAKE, PADDLE RIVER, PARKLAND. PEMBINA (LOBSTICK GLAUCONITIC AND LOBSTICK OSTRACOD POOLS), PINE CREEK, STOLBERG, WATERTON, WESTEROSE SOUTH, WILDCAT HILLS, AND WINDFALL.	496.4	165.1	4128.2	239.9	3888.3
BH 61-1	DELTA GAS & TRANSMISSION LTD.	MEDICINE HAT	9.5	3.5	71.0	-	71.0
BS 61-1	BAILEY SELBURN OIL AND GAS LTD.						
CS 61-1	THE CALIFORNIA STANDARD COMPANY						
COG 61-1	CHARTER OIL AND GAS LTD.						
SEL 61-1	SELBAY EXPLORATION LTD.						
JMW 61-1	J. MERRIL WRIGHT, JR.						
CD 63-1	CANADIAN DELHI OIL LTD.	MEDICINE HAT	4.3	1.57	32.3	-	32.3
CM 54-1 AND CM 61-2	CANADIAN-MONTANA PIPE LINE COMPANY	ADEN, BLACK BUTTE, COMREY, MANYBERRIES, PAKOWKI LAKE, PENDANT D'OREILLE, AND SMITH COULEE.	100.0	20.0	385 ⁽¹⁾	149.6	235.4
CP 63-1	CANADIAN PACIFIC OIL AND GAS LIMITED	MEDICINE HAT	0.1	0.0365	0.750	-	0.750

(1) TOTAL INITIAL MARKETABLE GAS IN THE FIELDS SHOWN.

PERMIT NUMBER	PERMITTEE	FIELDS UNDER PERMIT	PERMITTED WITHDRAWALS			WITHDRAWN TO SEPTEMBER 30, 1963 Bcf	REMAINING AUTHORIZED WITHDRAWAL Bcf
			MAXIMUM DAY MMcf	MAXIMUM ANNUAL Bcf	TOTAL Bcf		
CMM 61-1	J. RAY McDERMOTT & Co. INC.	MEDICINE HAT	8.8	3.0	62.0	-	62.0
MOG 61-1	MAYFAIR OIL & GAS (1961) LTD.						
ROC 61-1	RICHFIELD OIL CORPORATION						
HB 63-1	HUDSON'S BAY OIL AND GAS COMPANY LIMITED	MEDICINE HAT	1.02	0.372	7.65	-	7.65
SPC 57-1	MANY ISLANDS PIPE LINES LTD.	MEDICINE HAT	135.5	44.5	609.4	43.3	566.1
-	PEACE RIVER TRANSMISSION COMPANY LIMITED	POUCE COUPE	6.0	0.60	13.0	10.8	21.9
-	PEACE RIVER TRANSMISSION COMPANY LIMITED	POUCE COUPE SOUTH	6.9	0.98	19.7		
-	PATRICK T. BUCKLEY	YANALTA NO. 4 WELL	1.3 MMcf PER Mo.	0.010	-		
TC 54-1	TRANS-CANADA PIPE LINES LIMITED	ATLEE-BUFFALO, BINDLOSS, CESSFORD, COUNTESS, ERSKINE, FENN-BIG VALLEY, GILBY, HAMILTON LAKE, HOMEGLLEN-RIMBEY, KESSLER, NEVIS, OYEN, PINCHER CREEK, PRINCESS, PROVOST, SIBBALD, AND STETTLER.	697.9	221.2	4472.2	912.0	5580.0
TC 59-2	TRANS-CANADA PIPE LINES LIMITED	CARSTAIRS, CROSSFIELD (CARDIUM POOL), HARMATTAN-ELKTON (RUNDLE A POOL), HUSSAR, MEDICINE HAT, PREVO, WAYNE-ROSEDALE, AND WESTEROSE SOUTH.	353.8	88.5	1670.9		
TC 60-3	TRANS-CANADA PIPE LINES LIMITED	CHIGWELL, ENCHANT, MINNEHIK-BUCK LAKE, SEDALIA, THREE HILLS CREEK, WIMBORNE, AND WOOD RIVER.	59.0	19.7	348.9		
TC 60-4	TRANS-CANADA PIPE LINES LIMITED	INNISFAIL	VOLUMES NOT TO EXCEED THE TOTAL VOLUMES AUTHORIZED IN PERMITS NUMBERED TC 54-1, TC 59-2, AND TC 60-3.				

PERMIT NUMBER	PERMITTEE	FIELDS UNDER PERMIT	PERMITTED WITHDRAWALS			WITHDRAWN TO SEPTEMBER 30, 1963 Bcf	REMAINING AUTHORIZED WITHDRAWAL Bcf
			MAXIMUM DAY MMcf	MAXIMUM ANNUAL Bcf	TOTAL Bcf		
WC 52-1	WESTCOAST TRANSMISSION COMPANY LIMITED	BELLOV, BRAEBURN, BURNT RIVER, EAGLESHAM, GORDONDALE, POUCE COUPE, POUCE COUPE SOUTH, SADDLE HILLS, AND TANGENT.	190,0	52,0	870,0	150,3	719,7
WC 59-3	WESTCOAST TRANSMISSION COMPANY LIMITED	CROSSFIELD (CROSSFIELD CALGARY BASAL QUARTZ, RUNDLE, AND WABAMUN POOLS), AND SAVANNA CREEK,	162,2	53,1	1081,2	67,6	1013,6
WC 61-4	WESTCOAST TRANSMISSION COMPANY LIMITED	BOUNDARY LAKE SOUTH	VOLUMES NOT TO EXCEED THOSE AUTHORIZED IN PERMIT No. WC 52-1.				
WC 62-5	WESTCOAST TRANSMISSION COMPANY LIMITED	WORSLEY	53,3	16,0	220,0	12,0	208,0
TOTALS			2166,32	690,1685	13992,20	1585,5	12406,70

APPENDIX D

THE MEETING OF ALBERTA'S REQUIREMENTS FOR GAS, THE PRESENT PERMIT COMMITMENTS, AND THE RESULTING SURPLUS

Neither the applicant nor any of the interveners presented detailed evidence to show how Alberta's thirty-year requirements for gas may be met. The applicant, by referring to previous Board reports (1) (2) and updating the requirements shown in the December, 1959, report, contended that gas surplus to Alberta's long term requirements and the present permit commitments existed in the Province.

Since the last comprehensive analysis of requirements and availability of gas to meet the requirements was made some four years ago, the Board undertook a detailed new study to determine whether a surplus exists, and if so, its amount.

All volumes referred to in this Appendix are at 1,000 Btu per cubic foot.

The Meeting of Alberta's long Term
Requirements
October 1, 1963 - September 30, 1993

As discussed in Appendix C, the thirty-year requirements of the Province have been estimated at 8740 billion cubic feet with a terminal year peak day of 2300 million

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- (1) Report to the Lieutenant Governor in Council, December, 1959.
 - (2) Reserves of Gas, Natural Gas Liquids, Crude Oil and Sulphur of the Province of Alberta as of December, 1962.

cubic feet. The Board has studied the manner in which these future requirements may be met in two separate ways. Firstly, on the basis of the detailed 1963 forecast by major marketing areas, the Board prepared a detailed year by year illustrative deliverability analysis of the marketing areas and for the Province as a whole. This study indicated the portion of requirements by area and for the Province, which could be met from presently connected reserves and the amounts of other reserves required for the remainder of the requirements. Secondly, the Board has applied the "formula" approach discussed in its 1958⁽³⁾ and 1959 reports.

The formula, as it is applied in this Appendix, states that,

$$R_n = A_1 S + R_p$$

where,

R_n = total marketable reserves needed to meet requirements, billions of cubic feet

A_1 = annual requirement in the first year of the forecast, billions of cubic feet

S = summation factor

$A_1 S$ = sum of the annual requirements, in this case equal to 8740 billion cubic feet, billions of cubic feet, and

R_p = quantity of marketable gas needed to meet the terminal year peak day requirement, billions of cubic feet

(3) Report to the Lieutenant Governor in Council, September, 1958.

R_p may be determined using the relationship,

$$R_p = 1.3 FP_n - (1 - K) (1.3 FP_n + A_1 S)$$

where,

F = reserve-delivery ratio, billions of
cubic feet per million cubic feet per
day

K = reservoir recovery factor, fraction

P_n = terminal year peak day requirement,
million cubic feet per day

$1.3FP_n$ = marketable gas in place necessary to
meet the terminal year peak day
requirement, billions of cubic feet.

For the ratio F , the Board made use of the reserve-deliverability ratios indicated in the detailed deliverability analysis.

The formula method gives the same overall answer as does the detailed illustrative schedule method and is adopted for presentation here because,

- (a) it is much simpler leading directly to the total amount of gas required to meet Alberta's estimated thirty-year requirements, and
- (b) not requiring the selection of fields for illustrative purposes, it cannot lead even to suggestions of allocation, which despite the Board's emphasis on the illustrative nature of them appear to have been read into previous illustrative schedules.

The fields now connected to and supplying Alberta requirements are listed in Table D-1. The table also gives the Board's present estimate of the remaining reserves of marketable gas and the ratio of marketable gas in place to delivery capacity. A knowledge of the characteristics of the individual fields indicates that of the total of 5288 billion cubic feet shown in Table D-1 some 4200 billion cubic feet will be produced in the thirty-year period, and the remaining unproduced reserves will be capable of sustaining a peak day delivery of some 330 million cubic feet in the terminal year. This means that total deliveries of 4540 billion cubic feet ($8740 - 4200 = 4540$) and a terminal year peak delivery of 1970 million cubic feet per day ($2300 - 330 = 1970$) will be required from other sources. Thus, the total marketable gas needed to meet Alberta's thirty-year requirement is:

From now connected sources for actual delivery	4200
From additional sources for actual delivery	4540
From now connected sources to protect terminal year peak(1)	1088
From additional sources to protect terminal year peak(2)	<u>4543</u>
Total	14,371

(1) i.e. $5288 - 4200$

(2) Determined as $R_p = 1.3 FP_n - (1 - K) (1.3FP_n + A_1S)$
 $= 1.3 (2.4) (1970) - (1 - 0.85)$
 $\quad \quad \quad [1.3 (2.4) (1970) + 4540]$

$= 6146 - 1603 = 4543$ billion cubic feet

The large volume of gas required for the protection of the terminal year peak could and probably would be reduced through the further development of high deliverability storage projects with a lower reserve-deliverability ratio than the 2.4 here assumed. At this time, however, it seems proper to assume the ratio representing the average of the fields connected.

The Remaining Permit Commitments

The permit commitments remaining at September 30, 1963, have been shown in Appendix C to be some 12,407 billion cubic feet with a maximum peak day of 2166 million cubic feet prevailing to 1979 and declining thereafter. As in the case of the meeting of Alberta's long term requirements, the Board studied the manner in which these commitments may be met both through a detailed year by year illustrative deliverability analysis for each permittee and by the formula approach, using the reserve-deliverability ratios indicated in the detailed deliverability analysis. For the reasons previously mentioned, the results of the formula analysis are presented here.

The fields included in each of the present permits are shown in Table D-2. The table also shows the Board's present estimate of the remaining reserves of marketable gas and the ratio of marketable gas in place to delivery capacity.

The results of the Board's analysis with respect to

the meeting of the present permit commitments are shown in Table D-3. Columns 1 and 2 show respectively the remaining permit commitment and the maximum day authorized in the permits. These figures were obtained from Appendix C and are converted to the basis of 1000 Btu per cubic foot. The expiry date of the various permits is shown in Colum 3. Columns 4 and 5 present the Board's present estimate of the remaining marketable reserves and the reserve-delivery ratio, (both obtained from Table D-2) of the fields included in each permit. Column 6 shows the estimated quantity of marketable gas in place required to meet the peak day commitment in the terminal year of the permit. This quantity was obtained using the relationship $1.3 FP_n$.

Column 7 shows the marketable gas equivalent of column 6. The values were obtained by deducting from column 6 the marketable gas equivalent of the gas that will remain in the reservoirs at abandonment, i.e. $(1 - K)(1.3 FP_n + A_1S)$. The total amount of marketable gas required to meet the permit commitments, both annual and peak day, is shown in column 8. Columns 9 and 10 present the Board's estimate of the amount of marketable gas in the fields in the permit excess to the permit commitments before and after the expiry date of the permit.

On the basis of the Board's present estimates, and knowledge, the fields included in three of Westcoast

Permits numbered WC 52-1, WC 59-3, and WC 61-4, will not be able to deliver during the term of the permits the full volumes specified in the permits. Previously, the Board considered that a reserve-delivery ratio of 2.4 billion cubic feet per million cubic feet per day was appropriate for reserves from other sources and has, therefore, used this value to determine the additional quantity of gas needed to assure the removal of the volumes contained in the Westcoast permits.

In the case of the Westcoast south Alberta permit, the table shows that although the reserves in the fields included in the permit, some 1669 billion cubic feet, are greater than the remaining permit commitment of 1071 billion cubic feet, the delivery characteristics are such that neither the total quantity authorized can be produced during the term of the permit nor the peak day delivery of 171 million cubic feet be sustained. This deficiency is a consequence of the unexpected low deliverability of the wells in the Savanna Creek Field. It might be overcome by special well treatment or, conceivably, by the drilling of additional wells. There is also the possibility of Westcoast arranging for the additional deliverability from the Crossfield Field.

The situation is somewhat similar with respect to two of the Peace River area permits held by Westcoast. The reserves are estimated to be almost exactly equal to

the total remaining permit commitment, but an additional reserve of some 546 billion cubic feet is shown to be required to meet the terminal year peak day commitment of 199 million cubic feet. Conceivably, part of this deficiency could be satisfied if one or more of the fields included in the permits were extended.

It can be seen from the table that a total marketable reserve of 17,385 billion cubic feet is required to meet the commitment of all present permits of 12,756 billion cubic feet and a terminal year peak of 2300 million cubic feet. Since reserves of 18,681 billion cubic feet are available, a surplus of 1,296 billion cubic feet of gas exists in the fields included in the present permits. However, after the expiry date of the permits, several years before the end of the thirty-year period, an additional 4629 billion cubic feet, the amount of gas needed to meet the terminal year peak day commitment, will become excess to the present commitments.

The reserves available in the Province and the reserves needed to meet the thirty-year requirements of Alberta and the present permit commitments are shown in Table D-4. The table shows that a total of 36.2 trillion cubic feet of gas is available to meet the requirements and the commitments. The 1.9 trillion cubic feet from reserves now considered beyond economic reach and the continued use of two years' trend gas, which in this case

amounts to 3.6 trillion cubic feet, are both discussed in some detail in Appendix F. The total gas available does not include 0.5 trillion cubic feet of associated gas now considered within reach but which is required to assist the production of oil. This gas is expected to be unavailable until after the thirty-year period.

The Board has previously estimated that some 14.4 trillion cubic feet of gas will be needed to meet Alberta's long term requirements. This, added to the some 17.4 trillion cubic feet required to meet the present permit commitments, gives a total reserve required of some 31.8 trillion cubic feet. Subtracting the 31.8 trillion from the 36.2 trillion available, results in some 4.4 trillion cubic feet of reserves being surplus to the requirements and commitments. After the expiry date of the present permits, additionally some 4.6 trillion cubic feet of gas will be released from terminal year peak day protection.

Trans-Canada, in its application, estimated the surplus to be some 9.8 trillion cubic feet before the release of gas required to protect the terminal year peak day commitment in the permits. In its estimate, Trans-Canada used all of the gas now considered by the Board to be beyond economic reach, and considered that some 4.4 trillion cubic feet would be available from future discoveries and appreciation of known reserves. Subtracting from the estimate, 1.9 trillion cubic feet of gas now considered

beyond economic reach, which the Board estimates may not be available during the thirty-year period and reducing the 4.4 trillion cubic feet of trend gas to 3.6 trillion cubic feet that it is estimated will be available during the next two years from trends, Trans-Canada's estimate of the surplus reduces to 7.1 trillion cubic feet. This compares with the Board's estimate of 4.4 trillion cubic feet before the release of gas required to meet the terminal year peak day specified in the permits.

TABLE D-1

RESERVES PRESENTLY SUPPLYING
ALBERTA'S REQUIREMENTS FOR GAS

(ALL VOLUMES AT 1000 BTU PER CUBIC FOOT)

FIELD	MARKETABLE GAS AT SEPT. 30, 1963 BCF	RESERVE-DELIVERY RATIO BCF/MMCFD
ALEXANDER	13	0.46
BEAVERHILL LAKE	172	0.69
BOW ISLAND AND FOREMOST	39	0.91
CARBON	118	1.21
ELLERSLIE	8	1.00
ETZIKOM	34	1.38
FAIRYDELL-BON ACCORD	106	0.51
FORT SASKATCHEWAN	134	0.54
HAMELIN CREEK	15	0.63
HEART RIVER	2	1.00
JUMPING POUND AND SARCEE	559	2.44
MEDICINE HAT	130	1.90
MORINVILLE AND ST. ALBERT-BIG LAKE	163	1.47
NORMANDVILLE	25	3.44
OKOTOKS	133	9.34
RYCROFT	11	8.00
STETTLE AND FENN-BIG VALLEY	68	4.44
TURNER VALLEY	245	4.50 (E)
VIKING-KINSELLA	436	1.80
WAYNE-ROSEDALE	140	1.54
WESTLOCK	259	1.35
WHITELAW	21	1.87
WORSLEY	224	0.76

(E) ESTIMATED.

FIELD	MARKETABLE GAS AT SEPT. 30, 1963 Bcf	RESERVE-DELIVERY RATIO Bcf/MMcfd
OILFIELD GAS		
ACHESON	49	
BONNIE GLEN	237	
CAMPBELL-NAMAO	20	
GLEN PARK	15	
JUDY CREEK	216	
LEDUC-WOODBEND	38	
PEMBINA	770	
REDWATER	34	
SAMSON	11	
STURGEON LAKE SOUTH	68	
SWAN HILLS	426	
VIRGINIA HILLS	69	
WIZARD LAKE	113	
TOTAL OILFIELD GAS	2066	
AVERAGE RESERVE-DELIVERY RATIO FOR OILFIELD GAS		23.2

RESERVES SUPPLYING SMALL UTILITIES

ATHABASCA	4
ATHABASCA EAST	1
BANTRY-TILLEY	5
BONNYVILLE	3
BROOKS	4
BROOKS NORTH-EAST	15
CASTOR	2
COLD LAKE	2
DOWLING LAKE	3
DUVERNAY	2
ELK POINT	2

FIELD	MARKETABLE GAS AT SEPT. 30, 1963 Bcf	RESERVE-DELIVERY RATIO Bcf/MMcfd
FORT KENT	3	
HAIRY HILL	16	
HOLMBERG	21	
LAC LA BICHE	13	
LEAHURST	8	
LINDBERGH	11	
LLOYDMINSTER	3	
OBERLIN	1	
ST. PAUL	1	
SUFFIELD	19	
WATTS	2	
WILDMERE	9	
WILLINGDON	17	
TOTAL OF RESERVES SUPPLYING SMALL UTILITIES		167
AVERAGE RESERVE-DELIVERY RATIO OF RESERVES SUPPLYING SMALL UTILITIES		2.50
TOTAL RESERVES CONNECTED AND SUPPLYING REQUIREMENTS		5288
AVERAGE RESERVE-DELIVERY RATIO		2.49

TABLE D-2

MARKETABLE RESERVES AVAILABLE IN THE
FIELDS INCLUDED IN PERMITS

(ALL VOLUMES AT 1000 BTU PER CUBIC FOOT)

ALBERTA AND SOUTHERN GAS CO. LTD.

FIELD	MARKETABLE RESERVE AT SEPT. 30, 1963 BCF	RESERVE-DELIVERY RATIO BCF/MMCFD
BERLAND RIVER	300	0.89
BRAZEAU RIVER	156	5.70
BURNT TIMBER	130	9.72
CAROLINE	16	2.13
CARSON CREEK	DEFERRED	
CARSON CREEK NORTH		
CROSSFIELD	848	1.89
FOX CREEK	12	1.09
FOX CREEK NORTH	8	4.50
FOX CREEK WEST	19	3.17
HOMEGLEN-RIMBEY	176	1.52
KAYBOB	345	2.16
LOVETT RIVER	83	5.50
MINNEHIK-BUCK LAKE	527	3.12
PADDLE RIVER	160	3.67
PARKLAND	-	-
PEMBINA	184	4.61
STOLBERG	73	5.50
WATERTON	893	2.42
WESTEROSE SOUTH	730	2.23
WILDCAT HILLS	624	7.38
WINDFALL, BEAVER CREEK, AND PINE CREEK	1354	1.34
TOTAL	6638	
AVERAGE		2.88

CANADIAN-MONTANA GAS COMPANY LTD.

ADEN	36
BLACK BUTTE	59
COMREY	16

CANADIAN-MONTANA GAS COMPANY LTD. (CONT)

FIELD	MARKETABLE RESERVE AT SEPT. 30, 1963 Bcf	RESERVE-DELIVERY RATIO Bcf/MMcfd
MANYBERRIES	15	
PAKOWKI LAKE	8	
PENDANT D'OREILLE	81	
SMITH COULEE	20	
TOTAL	235	

TRANS-CANADA PIPE LINES LIMITED

ATLEE-BUFFALO	135	4.11
BINDLOSS	329	2.52
CARSTAIRS	930	1.88
CESSFORD	1339	3.23
CHIGWELL	62	1.34
COUNTESS	96	4.13
CROSSFIELD	22	50.00
ENCHANT	36	3.26
ERSKINE	-	-
FENN-BIG VALLEY	-	-
GILBY	531	2.48
HAMILTON LAKE	-	-
HARMATTAN-ELKTON	51	1.27
HOMEGLEN-RIMBEY	601	1.59
HUSSAR	513	1.98
INNISFAIL	70	11.45
KESSLER	52	1.40
MEDICINE HAT	380	5.45
MINNEHIK-BUCK LAKE	-	-
NEVIS	517	2.33
OYEN	34	1.96
PINCHER CREEK	855	3.98
PREVO	30	4.72
PRINCESS	209	2.76
PROVOST	455	2.31
SEDALIA	100	12.40
SIBBALD	48	2.62
STETTLER	-	-

TRANS-CANADA PIPE LINES LIMITED (CONT)

FIELD	MARKETABLE RESERVE AT SEPT, 30, 1963 BCF	RESERVE-DELIVERY RATIO BCF/MMCFD
THREE HILLS CREEK	204	4.73
WAYNE-ROSEDALE	190	2.54
WESTEROSE SOUTH	567	2.18
WIMBORNE	196	1.05
WOOD RIVER	31	2.54
TOTAL	8583	
AVERAGE		2.52

WESTCOAST TRANSMISSION COMPANY LIMITED (SOUTHERN ALBERTA)

CROSSFIELD	1271	3.74
SAVANNA CREEK	398	23.32
TOTAL	1669	
AVERAGE		4.71

WESTCOAST TRANSMISSION COMPANY LIMITED (PEACE RIVER)

BELLOY	88	2.44
BOUNDARY LAKE SOUTH	17	1.30
BRAEBURN	71	3.42
BURNT RIVER	10	1.83
EAGLESHAM	105	3.14
GORDONDALE	61	4.70
POUCE COUPE	66	2.77
POUCE COUPE SOUTH	83	2.73
SADDLE HILLS	60	3.25
TANGENT	179	4.38
WORSLEY	92	0.75
TOTAL	832	
AVERAGE		3.38

OTHERS

MEDICINE HAT	724	2.15
TOTAL (ALL FIELDS)	18,681	

TABLE D-3
RESERVES REQUIRED TO MEET PRESENT PERMIT COMMITMENTS
(ALL VOLUMES AT 1000 BTU PER CUBIC FOOT)

PERMITTEE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	REMAINING PERMIT COMMITMENT	MAXIMUM DAY	TERMINAL DATE	RESERVES IN	RESERVE-DELIVERY	MARKETABLE GAS	MARKETABLE GAS	TOTAL MARKETABLE	EXCESS GAS IN PERMIT FIELDS	
	TOTAL Bcf	MMcf	OF PERMIT	PERMIT FIELDS Bcf	RATIO OF PERMIT FIELDS Bcf/MMcf	IN PLACE REQUIRED TO MEET TERMINAL PEAK DAY Bcf	REQUIRED TO MEET TERMINAL PEAK DAY Bcf	GAS TO MEET PERMIT COMMITMENT Bcf	BEFORE TERMINAL DATE Bcf	AFTER TERMINAL DATE Bcf
ALBERTA AND SOUTHERN GAS CO. LTD.	4122	526	10/31/86	6638	2.88	1969	1299	5421	1217	2516
CANADIAN-MONTANA GAS COMPANY LTD.	235	100	3/14/86	235	-	-	-	235	-	-
TRANS-CANADA PIPE LINES LIMITED	5792	1153	5/14/81	8583	2.52	3777	2153	7942	641	2791
WESTCOAST TRANSMISSION COMPANY LIMITED (SOUTHERN ALBERTA)	1071	171	2/29/84	1669	4.71 ⁽¹⁾ 2.4 ⁽²⁾	869	610	1684	-15	598
WESTCOAST TRANSMISSION COMPANY LIMITED (PEACE RIVER)	833	199	12/31/79	832	3.38 ⁽¹⁾ 2.4 ⁽²⁾	764	546	1379	-547	-1
OTHERS	703	151	4/30/88	724	2.15	-	21	724	-	21
TOTALS	12756	2300		18681			4629	17385	1296	5925

(1) RESERVE-DELIVERY RATIO OF THE FIELDS INCLUDED IN THE PERMIT.

(2) RESERVE-DELIVERY RATIO OF OTHER SOURCE FIELDS.

TABLE D-4

SURPLUS

(ALL VOLUMES IN TRILLIONS OF CUBIC FEET AT 1000 BTU PER CUBIC FOOT)

<u>ESTABLISHED RESERVES</u>		
PRESENTLY CONSIDERED WITHIN ECONOMIC REACH	31.2	
FROM RESERVES PRESENTLY CONSIDERED BEYOND ECONOMIC REACH (ONE-HALF OF TOTAL)	1.9	
LESS: DEFERRED BEYOND 30 YEARS	0.5	
TOTAL RESERVES FROM PRESENT SOURCES		32.6
FROM 2 YEARS TRENDS		3.6
TOTAL RESERVES AVAILABLE		36.2

RESERVES NEEDED TO MEET REQUIREMENTS AND COMMITMENTSALBERTA REQUIREMENTS

PRESENTLY CONNECTED AND SUPPLYING REQUIREMENTS	5.3	
REQUIRED FROM OTHER SOURCES	4.5	
REQUIRED FROM OTHER SOURCES TO MEET TERMINAL YEAR PEAK	4.6	
TOTAL FOR ALBERTA REQUIREMENTS		14.4

PRESENT PERMIT COMMITMENTS

REQUIRED TO MEET COMMITMENTS	12.8	
REQUIRED TO MEET TERMINAL YEAR PEAK	4.6	
TOTAL REQUIRED TO MEET PERMIT COMMITMENTS		17.4
RESERVES REQUIRED TO MEET ALBERTA REQUIREMENTS AND PRESENT PERMIT COMMITMENTS		31.8
LESS: RESERVES RELEASED FROM PEAK PROTECTION AFTER EXPIRY OF PERMITS		4.6

TOTAL RESERVES NEEDED TO MEET REQUIREMENTS AND COMMITMENTS		27.2
SURPLUS BEFORE RELEASE OF RESERVES REQUIRED TO PROTECT PEAK DAY IN PERMITS.		4.4
SURPLUS AFTER RELEASE OF RESERVES REQUIRED TO PROTECT PEAK DAY IN PERMITS.		9.0

APPENDIX E

THE APPLICANT'S REQUEST FOR AUTHORIZATION FOR THE REMOVAL OF ADDITIONAL QUANTITIES OF GAS AND THE SURPLUS WHICH WOULD RESULT IF THE REQUEST WERE APPROVED.

Trans-Canada requested authorization to remove from Alberta a total of 9,640 billion cubic feet of gas at a maximum daily rate of 1,330 million cubic feet from the fields included in its present permits and from eleven new fields. For convenience in the study of the meeting of the requested volumes, the Board has converted the quantities to the basis of 1,000 Btu per cubic foot. The equivalent volumes become 10,042 billion cubic feet and 1,385 million cubic feet per day. All volumes subsequently referred to in this appendix will be on the basis of 1,000 Btu per cubic foot.

Trans-Canada is authorized under the present permits to remove 6,739 billion cubic feet of which 947 has been removed to September 30, 1963. Trans-Canada in effect requested authority to remove 9,095 billion cubic feet ($10,042 - 947 = 9,095$) as of September 30, 1963. Again the Board studied the manner of meeting the volumes requested both by detailed year by year analysis and by the formula approach.

The results of the Board's analysis is presented in Table E-1, which is identical in form to Table D-3 previously discussed. The table has three lines of entry: line 1

refers to the total volume requested by the applicant and the peak day volume considered appropriate by the Board, line 2 refers to that part of the total volume which the Board believes may be supported at full deliverability, and line 3 refers to the remaining part of the total volume. Columns 1 and 2 of the table show the total remaining volume requested by Trans-Canada and the maximum daily rate at which this volume is expected to be removed. The maximum day requested, 1385' million cubic feet, has been reduced to 1290 million cubic feet for reasons discussed in Appendix F. The 1290 million cubic feet per day has been derived by applying the expected system load factor to the requested annual volume. Column 3 shows the expiry date of the permit requested. The Board's present estimate of reserves in the fields included in the present permits and the new fields applied for is shown in column 4. Column 5 shows the Board's present estimate of the reserve-delivery ratio obtained from the detailed deliverability analysis. The quantities appearing in columns 4 and 5 were obtained from Table D-1 and from Table E-2 which lists the names, reserves, and reserve-delivery ratio of the eleven new fields applied for. Column 6 presents the quantity of marketable gas in place that would be required to meet the terminal year peak day of 1290 million cubic feet. The quantity shown in Column 6 was obtained by applying the relationship $1.3 FP_n$. Column 7 shows the marketable gas

equivalent of column 6 and is obtained by deducting from the quantity shown in column 6 the marketable gas equivalent of the gas that will remain in the reservoirs at abandonment. The total marketable gas required to meet the volume requested and the terminal year peak day is shown in column 8, and was obtained by summing the quantities shown in columns 1 and 7. Columns 9 and 10 show the marketable gas excess to the quantities requested before and after the expiry date of the permit.

It may be seen in line 1 of the table that the total reserve of some 9615 billion cubic feet is in excess of the volume of 9095 billion cubic feet requested. However, there is a deficiency of some 1494 billion cubic feet in reserves required for both the annual volumes and the terminal year peak day.

Because the reserves as presently estimated are not able to deliver the maximum quantity of 1290 million cubic feet per day during the entire twenty-five-year period, the Board determined how much gas could be withdrawn from the fields maintaining the marketable gas in place of 4209 billion cubic feet required to sustain the peak day demand of 1290 million cubic feet. The results of this calculation are shown in line 2 of the table. The Board calculated the quantity to be some 7307 billion cubic feet, which is equivalent to approximately seventeen years of production

at the rates requested by Trans-Canada in its application. At the end of this period, marketable reserves of some 2308 billion cubic feet would still be available for removal from the Province. The Board believes that the remaining portion of Trans-Canada's request, 1788 billion cubic feet ($9095 - 7307 = 1788$) could be produced during the remainder of the twenty-five-year period at less than the full deliverability rates - as recognized by the applicant.

In summary then, the reserves estimated to be present in all of the fields can produce the entire volume requested but are not able to sustain the maximum day delivery after about 1981.

Since all permits for the removal of gas from Alberta are issued on an as is basis rather than the 1000 Btu basis, the volumes previously referred to have been converted to the basis of 14.65 pounds per square inch absolute and 60 degrees Fahrenheit. The volume of gas which could be produced at full rates, estimated at about 7307 billion cubic feet of 1000 Btu gas, becomes some 7021 billion cubic feet. The remaining volume, 1788 billion cubic feet, that could be produced after about 1981 is equivalent to some 1718 billion cubic feet at 14.65 per square inch absolute and 60 degrees Fahrenheit.

Should the additional volumes requested be authorized, the Board estimates that the provincial gas surplus before

the release of reserves required for the protection of the peak day quantities specified in all permits would be reduced from 4.4 to 3.2 trillion cubic feet. After the expiry date of the permits, an additional 2.5 trillion cubic feet of gas will be released from terminal year peak day protection. The manner in which the new surplus was calculated is shown in Table E-3.

TABLE E-1

RESERVES REQUIRED TO MEET THE REQUEST OF TRANS-CANADA PIPE LINES LIMITED

(ALL VOLUMES AT 1000 BTU PER CUBIC FOOT)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
REMAINING VOLUMES REQUESTED									
TOTAL BCF	PEAK DAY MMCF	TERMINAL DATE OF REQUEST	RESERVES IN FIELDS BCF	RESERVE-DELIVERY RATIO BCF/MMCFD	MARKETABLE GAS IN PLACE TO MEET PEAK DAY REQUESTED BCF	MARKETABLE GAS REQUIRED TO MEET PEAK DAY REQUESTED BCF	TOTAL MARKETABLE GAS REQUIRED TO MEET REQUEST BCF	BEFORE EXPIRY DATE BCF	AFTER EXPIRY DATE BCF
9095	1290	31/10/89	9615	2.51	4209	2014	11,109	-1494	520
7307	1290		9615	2.51	4209	2308	9,615	0	2308
1788	-	31/10/89	2308	-	-	-	1,788	520	520

TABLE E-2
RESERVES IN NEW FIELDS APPLIED FOR
(ALL VOLUMES AT 1000 BTU PER CUBIC FOOT)

FIELD	MARKETABLE GAS AT SEPT. 30, 1963 Bcf	RESERVE-DELIVERY RATIO Bcf/MMcfd
CONNORSVILLE	18	3.33
CROSSFIELD EAST	239	1.49
FENN WEST	5	2.34
HACKETT	55	3.29
LONE PINE CREEK	106	7.71
OLDS	210	4.23
RETLAW	34	1.57
RICH	13	1.56
ROSEBUD	20	6.25
SYLVAN LAKE	295	3.14
VERGER	37	0.59
TOTAL	1032	
AVERAGE		2.35

TABLE E-3
NEW SURPLUS

(ALL VOLUMES IN TRILLIONS OF CUBIC FEET AT 1000 BTU PER CUBIC FOOT)

TOTAL ESTABLISHED RESERVES AVAILABLE (FROM TABLE D-4)	36.2
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REQUIREMENTS AND COMMITMENTS

TOTAL RESERVES NEEDED TO MEET ALBERTA REQUIREMENTS (FROM TABLE D-4).	14.4
---	------

PERMIT COMMITMENTS

RESERVES REQUIRED TO MEET COMMITMENTS	16.1	
RESERVES REQUIRED TO MEET TERMINAL YEAR PEAK	2.5	
TOTAL RESERVES REQUIRED TO MEET COMMITMENTS	18.6	
RESERVES REQUIRED TO MEET ALBERTA REQUIREMENTS AND PERMIT COMMITMENTS	33.0	
LESS: RESERVES RELEASED FROM PEAK PROTECTION AFTER EXPIRY OF PERMITS	2.5	
TOTAL RESERVES REQUIRED TO MEET REQUIREMENTS AND COMMITMENTS		30.5
 SURPLUS BEFORE RELEASE OF GAS REQUIRED TO PROTECT PEAK DAY IN PERMITS		3.2
 SURPLUS AFTER RELEASE OF GAS REQUIRED TO PROTECT PEAK DAY IN PERMITS		5.7

APPENDIX F

OTHER MATTERS ARISING OUT OF THE APPLICATION

Within the scope of this Appendix are most of the parts of the application in which amendments to permits and consolidation of them were requested. They appear herein under the headings

- (a) Daily Volume Limitations
- (b) Extension of Period of Existing Permits
- (c) Measurement of Gas Removed from the Province
- (d) Permit Consolidation, and
- (e) Deletion of a Proviso of Paragraph 5 of Permit No. TC 54-1.

Also dealt with in this Appendix are the following subjects which, arising from the application, were commented on at the hearing

- (a) Deletion of Certain Fields from Paragraph 5 of Permit No. TC 54-1
- (b) The Use of "Trend" Gas in Computing Alberta's Surplus, and
- (c) Allocation of Gas Considered to be Beyond Economic Reach.

Daily Volume Limitations

Trans-Canada requested the deletion of permit daily volume limitations to provide more flexibility in its day to day operations. Mr. Horte, in giving evidence, stated that in addition to the increased volumes of gas required by consumers

in the winter months and for which a maximum daily requirement can be estimated, there is a need for additional volumes over short periods of time due to operating problems which may arise. If a compressor station on the transmission line becomes inoperative, the inventory of gas in the pipe line, or "line pack", is used to some extent to keep up the supply of gas at the downstream end of the pipe line. When the compressor station is put back in service, it is desirable to rebuild the line pack as soon as possible. This may be hampered by the maximum day restrictions contained in the permits.

Mr. Willson, of the utility companies, in answer to a question, stated that his companies had no objection to the request.

In December, 1963, while the present application was still under Board consideration, Trans-Canada found it necessary, due both to the operating difficulties mentioned, and to increases in sales, to request the Board for an immediate amendment to each of Permit No. TC 54-1 and Permit No. TC 59-2 increasing the permitted maximum daily rates of removal. On December 31, as a partial and interim decision based on the subject application, the Board, with the approval of the Lieutenant Governor in Council, issued amendments increasing the authorized maximum daily rates from 680 to 710 million cubic feet per day for Permit No. TC 54-1 and from 270 to 360 million cubic feet per day for Permit No. TC 59-2.

Maximum daily restrictions have been included in permits

issued by the Board as a form of protection for Alberta consumers. The Board agrees with the applicant that the restriction might be eliminated from the Trans-Canada permits without immediate risk to the protection of Alberta consumers. Having regard to the future, however, both with respect to the applicant's permits and other permits which have been or may be issued, the Board believes that in the interest of the Province it must retain control of maximum daily rates of removal of gas.

A further consideration with respect to the inclusion of a maximum daily limitation in a permit is the Board's reservation from surplus declaration of the reserves necessary to provide for terminal year peak deliverability at the maximum daily rates authorized in the permit. Thus, the maximum daily rate limitation has provided the permittee some degree of protection.

The Board recognizes the desirability of some flexibility for the operating problems mentioned by the applicant. It believes it may best be provided by inclusion in the permit of a clause which would allow, when required to overcome operating problems, the maximum daily rate specified in the permit to be exceeded nominally on occasion. With such a provision, the Board believes that the authorized daily maximum rate of removal in the permit should be limited to that calculated by applying the anticipated system load factor to the authorized maximum annual rate of removal.

Extension of Period of Existing Permits

Each of the permits held by Trans-Canada expires on May 14,

1981. The applicant requested that the term of the permits be extended to October 31, 1989.

Mr. Horte stated that, as the fields named in the subsisting permits expand by further development, the applicant continually enters into new contracts for the purchase of gas in these fields. The contracts are for twenty-five year terms and an extension of the permit period would be necessary to enable all the gas under contract to be removed from the Province during the terms. He said that in addition continued production of gas after May 14, 1981, from some lands under old contracts is expected.

The Board has made it a practice recently to issue permits for a period which would allow the removal of gas for twenty-five years. This is the first major request the Board has received for the extension of the term of a permit to permit the removal of gas over a period beyond twenty-five years. For this reason, the Board has given general consideration to what would be a proper term for a permit with respect to both the initial term and to possible extensions. The twenty-five year period is believed appropriate having regard to the protection of the Province, the normal term of gas purchase contracts, the expected productive life of gas fields, the period required for the amortization of the cost of physical facilities and the financing of pipe line projects. In considering a request for an extension of the period of a permit the Board believes that consideration should be given to much the same factors and that

the maximum term for which any permit should be extended is twenty-five years - adjusted if necessary to correspond to the contract year.

Closely related to the initial term of a permit or an extension of it is the manner in which the volume and rate restrictions are expressed. When the Board has issued a permit for the removal of gas from the Province or has amended a permit it has satisfied itself not only that the gas proposed to be removed is surplus to the requirements of the Province, but also that there appears to be sufficient gas in the fields from which the removal is authorized to allow deliveries at both the rates and the total amount permitted. Where, as in most cases, a maximum daily rate is prescribed for the full period of the permit, this means that the Board has satisfied itself that reserves adequate to provide deliveries at the maximum daily rate will exist in the ground at the end of the permit period. These reserves therefore would be regarded as unavailable for other use during the term of the permit but would become available upon its termination.

In considering the present application the Board recognized, as did the applicant, that the additional gas requested from the fields now under permit could neither all be produced within the remaining period of the permits (some 18 years) nor be produced for the full period of the extension requested at the maximum daily rates possible for the remaining period of the existing permits. As Mr. Horte has stated, an extension

is necessary to allow the permittee to remove all of the gas under contract and particularly that gas placed under contract following extension of fields. The Board, therefore, believes it proper that the period of the permit be extended even though, due to declining field deliverability, reserves adequate to provide deliveries at the maximum daily rate would not remain in the ground at the end of the extended permit period.

In its calculations of reserves needed to meet the commitment of the permit the Board would recognize that beyond the initial term of the permit the peak day delivery capacity would be declining and that additional reserves, or "cushion gas" would not be provided for its protection. The Board believes it proper that any amendment extending an initial permit period should make allowance for the anticipated productivity decline in the specification of permitted maximum daily rates. This could be accomplished by specifying that the volumes of gas to be removed from the permitted fields beyond the initial term of the permit would be removed at such lesser rates than those specified for the original term, as would be consistent with field delivery capacity and good engineering practice. This would give the permittee the flexibility to remove gas at rates up to the proper physical limitations of the fields. For such gas, however, the Board would not recognize any reserves for peak day deliverability (cusion gas) in its calculations of reserves necessary to protect the permit commitment. This in effect would lead to the inclusion in the permit of volume provisions

limited in three ways, one specifying maximum daily and maximum annual volumes of gas for the initial part of the term, one providing such lesser maximum daily rate as would be determined by good engineering practice for the remaining part of the term and one specifying the total volume of gas for the entire term of the permit.

In the case of the present application, the Board is in favour of extending the period of the permits subject to the provisions outlined above.

Measurement of Gas Removed from the Province

The permits now held by Trans-Canada require that all gas removed from the Province thereunder "shall be measured by the Permittee". The applicant requested that the permits be amended to provide that all gas removed from the Province thereunder "shall be measured by or on behalf of the Permittee".

Mr. Horte stated that his company was contemplating the sale of its meter station located at the Alberta-Saskatchewan border to The Alberta Gas Trunk Line Company. This would allow Trunk Line to measure all volumes of gas entering and leaving its system and provide for more effective control of its operations. Trans-Canada would still be responsible for the measurement but Trunk Line would act as its agent.

The Board notes that measurement of gas removed from the Province through the foothills division of Trunk Line is made under the type of arrangement proposed. It provides for a more efficient pipe line operation without impairing provincial

protection. Such an arrangement is within meaning and intent of the measurement provision as now worded. However, as the applicant claimed it would take further assurance from the amendment proposed, the Board is agreeable to the amendment.

Consolidation of Permits

The applicant holds four permits each authorizing the removal of gas in specified volumes from a field or a group of fields. It argued that because contract volumes are continually being revised due to redeterminations of reserves resulting in increases or decreases of reserves under contract and because new contracts are entered into upon further field developments, flexibility in purchasing gas is reduced by individual permit limitations.

The Board believes that consolidation of the permits in one permit would be desirable for the reason given by the applicant and also for purposes of administration. It would not result in any lessening of protection for Alberta consumers.

As pointed out by the applicant, a consolidation of the permits would eliminate the variations which now exist in the permits and some phrasing which is no longer appropriate because of changed circumstances. The Board believes this to be desirable.

Deletion of a Proviso of Clause 5 of the Terms and Conditions of Permit No. TC 54-1

Clause 5 of the terms and conditions of Permit No. TC 54-1 states that Trans-Canada may produce, purchase or otherwise

acquire for removal from the Province gas produced from eighteen named fields, "provided, however, that the total and daily amounts of gas to be withdrawn by or on behalf of Trans-Canada from each of the Erskine, Fenn-Big Valley, Homeglen-Rimbey, Nevis and Stettler Fields are subject to the approval of the Board."

Mr. Horte stated that Trans-Canada no longer saw the need for such a provision in view of the fact that it now has an agreement with Canadian Western Natural Gas and Northwestern Utilities to provide them with gas from this or any other area of the Province in the event they are unable to arrange for their own supply.

The utility companies, in their submission, suggested that the proviso should not be removed. Mr. Willson stated that the problem which gave rise to the proviso, i.e. the apparent lack of reserves available to the utility companies in Central Alberta for their long term requirements in that area, still existed.

The Board considers that this part of the application should be granted as it is in accordance with the policy it follows in the administration of The Gas Resources Preservation Act, 1956. The Board believes that the presence of the Alberta Gas Trunk Line systems and of provisions in the Act and permits regarding the supply of gas to consumers within the Province safeguard the long term requirements of the area so that the proviso in Permit No. TC 54-1 is unnecessary. In addition, the contract between Trans-Canada and the utility companies, while not under control

of the Board, does provide a mechanism which would facilitate the implementation of the above provisions.

Deletion of Certain Fields from Clause 5 of the
Terms and Conditions of Permit No. TC 54-1

The submission of the utility companies suggested that the names of the Fenn-Big Valley and Stettler Fields should be removed from the list of fields contained in clause 5 of Permit No. TC 54-1. This is a list of fields from which Trans-Canada is authorized to remove gas pursuant to the permit. The submission stated that since these fields are being used to supply local needs their names should be eliminated from the permit.

Mr. Horte stated that while Trans-Canada had not contracted for any gas produced in these fields, The British American Oil Company Limited is delivering small volumes from the Fenn-Big Valley Field to Trans-Canada in exchange for fuel gas being supplied by Trans-Canada at Pincher Creek for the Lookout Butte Plant. He pointed out that the naming of the fields in the permit did not prevent others from contracting for the gas for local use and he suggested that the permit not be amended as suggested by the utility companies.

The Board does not believe it would be proper to consider the amendment suggested without the application for amendment having been advertised in order that producers in the fields concerned or other interested persons might be heard.

The Use of "Trend" Gas in Computing Alberta's Surplus

In calculating its estimate of gas surplus to Alberta

requirements, the applicant adopted the method used by the Board in its December, 1959 report⁽¹⁾, wherein reserves which are expected to be established within the next two years, based on the trends in growth of Alberta reserves, are deemed to be available for meeting a portion of the thirty-year Alberta requirements.

The utility companies expressed concern at the increasing percentage of Alberta's requirements which the Board had shown as being met from "trend gas" in its 1954, 1958 and 1959 reports, particularly in view of an apparent decline since 1959 in reserves discovered per wildcat well drilled.

Both Mr. H. G. Nicholson, for The California Standard Company, and Mr. A. H. Denny, for Pan American Petroleum Corporation, advocated a continuation of the Board's policy of recognizing two years future gas discoveries when considering the meeting of Alberta's requirements.

The Board believes the use of only two years of expected growth in reserves toward the meeting of thirty-year anticipated requirements to be conservative. If a declining rate of discovery is obtained from the trend data (as has been the case over the last few years) the amount of future reserves allocated for Alberta requirements will also be decreased. The amount of 3.6 trillion cubic feet has been used in this report, compared to 4.4 trillion cubic feet in the 1959 report.

(1) Report to the Lieutenant Governor in Council with respect to Applications under The Gas Resources Preservation Act, 1956, page D-10.

Allocation of Gas Considered to be Beyond Economic Reach

Trans-Canada in its calculation of reserves surplus to Alberta requirements included as available all of the remaining marketable gas reserves. The Board in its computation shown in the 1959 report included only the established reserves within economic reach.

Mr. Willson stated that the utility companies wished to make a strong representation for continuation of the practice of deducting from the total established gas reserves of the Province, gas which is considered beyond economic reach, before determining whether there is gas surplus to Alberta requirements.

Mr. Blair, for Alberta and Southern, stated that he thought it would be perfectly proper for the Board to include in its calculation gas presently considered to be beyond economic reach. He indicated that such gas would become available as pipe lines extended and would contribute to future requirements of both provincial and extra-provincial markets. Mr. Blair's views were supported by Mr. Denny of Pan American.

In the past, the Board has not used any portion of the reserves considered beyond economic reach in estimating the quantity of gas needed to meet Alberta's requirements and the permit commitments. In view of the interest shown at the hearing, the Board has given fresh thought to this question. The Board is confident that much of the reserves now classified as beyond economic reach will not remain so during the entire thirty-year period.

The reserves now considered beyond economic reach were analysed, and having in mind the magnitude of each reserve, its location, the nearness of pipe lines, the expected development in drilling and in transportation facilities, the Board considers that approximately one-half of the 3,701 billion cubic feet now beyond reach will either have been marketed or will be connected to a pipe line by the end of the thirty-year period. Therefore, the Board in the calculation of gas surplus to Alberta's requirements and the present permit commitments has included one half of the reserves presently considered beyond economic reach.

APPENDIX G

IN THE MATTER of The Gas Resources Preservation Act, 1956, being chapter 19 of the Statutes of Alberta, 1956; and

IN THE MATTER of a Permit to Trans-Canada Pipe Lines Limited authorizing the removal of gas from the Province.

PERMIT NO. TC 64-5

WHEREAS Trans-Canada Pipe Lines Limited (herein called "the Permittee"), is removing gas from the Province under authority of Permits Numbered TC 54-1, TC 59-2, TC 60-3 and TC 60-4; and

WHEREAS the Permittee has applied to the Oil and Gas Conservation Board for an increase in the volumes of gas that it may remove from the Province, and for amendment and consolidation of the permits it now holds and the permit applied for; and

WHEREAS the Board upon inquiry into and hearing of the application has found that the applicant is a person who has entered into contracts to purchase gas within the Province and who intends to cause such gas to be removed from the Province and that the provisions of The Gas Resources Preservation Act, 1956, affecting the application have been complied with; and

WHEREAS the Board is of the opinion that the granting of this Permit for the removal of gas from the Province is

in the public interest having regard to the present and future needs of persons within the Province, and to the established reserves and trends in growth and discovery of the reserves of gas in the Province; and

WHEREAS the Lieutenant Governor in Council has given his approval by Order in Council numbered O.C. and dated .

THEREFORE, the Oil and Gas Conservation Board, pursuant to the provisions of The Gas Resources Preservation Act, 1956, being chapter 19 of the Statutes of Alberta, 1956, hereby grants a permit to Trans-Canada Pipe Lines Limited, and hereby authorizes the removal of gas from the Province, subject to the regulations and orders made pursuant to the provisions of the said Act and to the terms and conditions prescribed in this Permit, as follows:

1. Subject to the conformity by the Permittee with the terms and conditions hereof, this Permit shall be operative for a term commencing on the date hereof and ending on October 31, 1989.

2. The quantity of gas that may be removed from the Province pursuant to this Permit shall not exceed

- (a) for the period ending October 31, 1981, 1,240,000,000 cubic feet in any consecutive twenty-four hour period or 425,000,000,000 cubic feet in any consecutive twelve-month period,

(b) for the period commencing November 1, 1981, and ending October 31, 1989, in any consecutive twenty-four hour period or in any consecutive twelve-month period such quantities less than those prescribed in subclause (a) as may be limited by field productivity and good engineering practice, and

(c) for the term of the permit, that quantity of gas which together with the gas removed under Permit No. TC 54-1, Permit No. TC 59-2, Permit No. TC 60-3 and Permit No. TC 60-4 shall total not more than 9,640,000,000,000 cubic feet of gas.

3. Notwithstanding the provisions of clause 2, subclause (a), the Permittee, for the purpose only of alleviating temporary operating problems caused by pipe line or equipment failure, may remove in any consecutive twenty-four hour period 110 per cent of the volume of gas authorized by said subclause (a).

4. The Permittee, for the purpose of this Permit, may purchase or otherwise acquire for removal from the Province, and subject to clause 5 there may be removed from the Province under the authority of this Permit, only gas produced from the following pools, fields and areas:

Atlee-Buffalo Field
Bindloss Field
Carstairs Field
Cessford Field
Chigwell Field
Connorsville Field
Countess Field
Crossfield Cardium Pool
Crossfield East Field
Enchant Field
Erskine Field
Fenn-Big Valley Field
Fenn West Field
Gilby Field
Hackett Field
Hamilton Lake Field
Harmattan-Elkton Rundle A Pool
Homeglen-Rimbey Field
Hussar Field
Innisfail Field
Kessler Field
Lone Pine Creek Field
Minnehik-Buck Lake Field
Nevis Field
Olds Field
Oyen Field

Pincher Creek Field

Prevo Field

Princess Field

Provost Field

Retlaw Field

Rich Field

Sedalia Field

Sibbald Field

Standard Field

Stettler Field

Sylvan Lake Field

Three Hills Creek Field

Verger Field

Wayne-Rosedale Field

Westrose South Field

Wimborne Field

Wood River Field

The area in the Medicine Hat Field being north of Sections 1, 2, 3, 4, 5 and 6, in Township 15, and in Ranges 1, 2 and 3, West of the Fourth Meridian, excepting therefrom Section 7, Township 15, Range 2, West of the Fourth Meridian.

5. Gas acquired in Alberta by the Permittee, in exchange for equal volumes of gas, adjusted for any difference in higher heating value, produced from pools,

fields, or areas named in clause 4, may be removed from the Province under the authority of this Permit.

6. The Permittee shall remove or cause to be removed pursuant to this Permit only such gas as is delivered to it through facilities of The Alberta Gas Trunk Line Company Limited at the interconnection of their pipe lines in the North-east quarter of Section 11, Township 20, Range 1, West of the Fourth Meridian.

7. (1) All gas removed from the Province pursuant to this Permit shall be measured by or on behalf of the Permittee by master meters approved by the Board and located at the point at which gas is delivered by The Alberta Gas Trunk Line Company Limited to the Permittee.

(2) The specific gravity and higher heating value of all gas received by the Permittee through the facilities of The Alberta Gas Trunk Line Company Limited shall be measured by or on behalf of the Permittee at the point at which gas is delivered by The Alberta Gas Trunk Line Company Limited to the Permittee.

(3) The measurements required by this clause shall be made in a manner approved by the Board and shall be reported monthly in a manner approved by the Board.

8. Subject to section 14 of the said Act, all quantities of gas for the purpose of this Permit shall be referred to a 14.65 pounds per square inch absolute pressure base and a 60 degree Fahrenheit temperature base.

9. Notwithstanding the provisions of any contract for the purchase or other acquisition of gas, the Board may require the extraction of any substance or substances except methane from any gas before its removal from the Province pursuant to this Permit.

10. The Permittee will supply gas from the pipe line of The Alberta Gas Trunk Line Company Limited at a reasonable price to any community or consumer within the Province that is willing to take delivery of gas at a point on the pipe line, and that, in the opinion of the Board, can reasonably be so supplied by the Permittee.

11. If any community or consumer is willing to take delivery of gas pursuant to clause 10 of these terms and conditions, and agreement on the price to be paid for the gas cannot be reached, the price to be paid shall be determined by the Public Utilities Board on the application of an interested party, and the part of the price attributable to transportation shall be based on the assumption that the gas has been supplied from the capable source or sources available to the Permittee nearest to the point of delivery.

12. Notwithstanding the provisions hereof, the Permittee shall comply with the provisions of any Act, competent regulation, order or direction governing the drilling for, production, conservation, gathering, transportation, processing, purchasing, acquisition, sale, measurement, reporting, testing, supply or delivery of

gas within the Province.

13. Permit No. TC 54-1, Permit No. TC 59-2, Permit No. TC 60-3 and Permit No. TC 60-4 are rescinded.

MADE at the City of Calgary, in the Province of Alberta, this day of , A.D. 1964.

OIL AND GAS CONSERVATION BOARD,

G. W. Govier,
Chairman.

